BANGALORE WATER SUPPLY AND SEWERAGE BOARD

6th Floor, Cauvery Bhavan "D" Block,
K.G. Road, Bangalore 560009

Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge

(Through KPPP Portal only)

https://www.kppp.karnataka.gov.in

Office of the Chief Engineer (Waste Water Management-West)
BANGALORE WATER SUPPLY & SEWERAGE BOARD
6th Floor, Cauvery Bhavan D-Block,
K.G. Road, Bangalore 560009
Telephone – 080-22945350

TENDER REFERENCE :	:	No.:BWSSB/CE(WWM-W)/ACE(WWM-N-W)/ DCE(WWM-E&W)/TA-2/837/2023-24Dated:01.02.2024
NAME OF THE WORK	:	Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge
LAST DATE AND TIME FOR RECEIPT OF TENDERS	:	16.02.2024 16:30 hrs
TIME AND DATE OF OPENING OF TECHNICAL TENDERS	:	17.02.2024 17.00 hrs
PLACE OF OPENING OF TECHINCAL TENDERS	:	Office of The Chief Engineer (Waste Water Management-West) Bangalore Water Supply & Sewerage Board 6th Floor, Cauvery Bhavan D-Block, K.G. Road, Bangalore 560009
TIME AND DATE OF OPENING OF PRICE TENDERS	:	Will be intimated to the qualified tenderers
PLACE OF OPENING OF PRICE TENDER	:	Will be intimated to the qualified tenderers
ADDRESS FOR COMMUNICATION	:	Office of The Chief Engineer (Waste Water Management-West) Bangalore Water Supply & Sewerage Board 6th Floor, Cauvery Bhavan D-Block, K.G. Road, Bangalore 560009

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BANGALORE WATER SUPPLY AND SEWERAGE BOARD
Office of The Chief Engineer (Waste Water Management-West)
6th Floor, Cauvery Bhavan, K.G. Road, Bangalore-560009

INVITATION FOR TENDER

(ONLY THROUGH KPPP PORTAL)

IFT No.: BWSSB/CE(WWM-W)/ACE(WWM-N-W)/DCE(WWM-E&W)/TA-2/837 /2023-24

Dt:01.02.2024

SECTION 1

INVITATION FOR TENDER

1. The Chief Engineer(Waste Water Management-west) invites tenders from eligible tenderers for the **Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge** detailed in the table below. Tenderers are requested to submit their tender, EMD and details of their capability to undertake the tender (as detailed in ITT Clause-3 & 6) in the Karnataka e-Procurement Portal. Price tender will be opened only if the Tenderer is found to be qualified to execute the tendered works. Tenderers are advised to note the minimum qualification criteria specified in clause 3 of the Instructions to Tenderers to qualify for award of the contract.

2. Tender documents may be downloaded through Kppp Portal www.Kppp.karnataka.gov.in website only from **02.02.2024 to 16.02.2024** Interested Tenderers may obtain further information by accessing the same website.

3. Tenders must be accompanied by Earnest Money Deposit specified for the work in the Table below. EMD will have to be in any one of the forms as specified in the Tender document and shall have to be valid for **45**days beyond the validity of the tender.

4. The last date and time for receipt of tenders in the Electronic Tender Box in website (www.Kppp.karnataka.gov.in) is **16.02.2024 up to 16:30 hrs**. The technical bids will be opened on **17.02.2024 at 17:00 hrs**. If the bid-opening day remains as public holiday, bids will be opened on the next working day at the original stipulated time.

5. Other details can be seen in the tender documents.

Sl. No	Name of the work	Tender processing fee	Amount put to tender Rs. (approx)	Bid security Rs. (EMD)	Period of completion	Eligibility criteria during last 5 years (2018-19, 2019-20 & 2020-21,2021-22,2022-23,)

						Financial Turnover (in all classes of Civil Engg. Construction works) for any of the two years during the last five years Rs.	Performance and work Qualification
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge	As per e-procurement portal.	**3563.75 lakh (excluding GST)**	**42.05 lakh**	**30 months**	**3364.18 lakh**	1) As prime contractor, should have satisfactorily completed at least one similar work of value not less than **Rs.2102.61** lakh in the last five financial years 2018-19 to 2022-23. 2)The tenderer should have executed in any one financial year, a minimum quantity of: **i) 10901Cum** of Earth Work Quantity. **ii) 1318Rmt.** of 1600mm dia and above RCC NP-3 class sewer. **iii) 58Rmt** of 1800mm dia & above MS Casing pipe through Trenchless Technology. **v) 3364 Cum** of RCC M25 grade and above. **vi)35Rmt** of MWSL (Machine Wounded Spiral Liner) 3) Each tender should further demonstrate: i) Assessed available tender capacity = **(A*N*1.5 - B)>= Rs.4205.22 lakh** 4) Liquid assets and /or availability of credit facilities of not less than **Rs.560.70lakh** (Credit lines/ letter of credit/certificates from Nationalized / Schedule banks in India for meeting the fund requirement etc.,

Note :

1. a. The Amount put to tender Rs.3563.75 Lakh is Excluding GST at 18%. Accordingly the bidder should quote for excluding GST amount.

b. The GST amount is of Rs.641.47 Lakh.

2. The Financial bid evaluation will be based on 1(a) of above Note.

6. EMD shall be paid through OTC, NEFT, DEBIT CARD & CREDIT CARD through Kppp Portal Only. The value of the Bid Security / EMD is as mentioned in the table above in column no 5.
7. Tenderers can access tender documents from www.Kppp.karnataka.gov.in website only and upload the required details; those are mentioned in different sections in the bid document in to electronic tender on the website. Scanned documents those are required to be furnished as per Section 2, 3 & 4 of the bid document shall be submitted through Kppp Portal.
8. The Tender processing fee once paid will not be refunded.
9. The successful Tenderer would be required to furnish the performance Bank Guarantee from a Nationalized / Scheduled Indian Bank, with jurisdiction at Bangalore as specified, towards guarantee for completion of work within the stipulated period as mentioned in tender document.
10. Applications / requisitions from joint venture Firms are not acceptable.
11. Bangalore Water Supply and Sewerage Board (BWSSB) reserves the right to cancel or annul the entire or part of this process of invitation at any time without assigning any reasons.
12. For any additional information regarding the above tender, the firms who are interested to quote, may contact office of the undersigned at the office address given below on all working days during office hours (10:30hours to 17:00 hours).

Bangalore Water Supply & Sewerage Board
Office of Chief Engineer (Waste Water Management-West)
6th Floor, Cauvery Bhavan,
K.G.Road, Bangalore.
Telefax:080-22945106

13. Tenderers shall submit offers that comply with the requirements of the bid document.
14. The successful bidder has to follow the SWM (Solid water management) Rules 2016 for this tender.

Corrigendum / Modification / Corrections, if any will be published in the website only.

Sd/-
Chief Engineer
(Waste Water Management-West)

SECTION 2:

INSTRUCTIONS TO TENDERERS (ITT)

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A. General

1. Scope of Tender

1.1 The **Chief Engineer (WWM-W),** (Referred to as Employer in these documents) invites tenders following Two Stage Kppp Portal procedure, from eligible Tenderers, **Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge** (as defined in these documents and referred to as "the work") detailed in the Table given in the Invitation for Tenders (IFT).

2. **Eligible Tenderers**

2.1 Tenderers shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Government of Karnataka

2.2 Tenders from Joint ventures are not acceptable.

3. Qualification of the Tenderer:

3.1 All Tenderers shall provide the requested information accurately and in sufficient
detail in Section 3: Qualification information.

3.2 To qualify for award of this contract, each Tenderer in its name should have in the
last five years i.e. 2018-19 to 2022-23)

a) Achieved in at least two financial years a minimum financial turnover (in all classes of civil engineering construction works only) of **Rs.3364.18 lakh.**

b) As prime contractor, should have satisfactorily completed at least one similar work of value not less than **Rs.2102.61 lakh** in the last five financial years 2018-19 to 2022-23.

a) Should have executed in any one financial year, a minimum quantity of :

i. 10901 Cum of Earthwork Quantity
ii. 1318 Rmt. of 1600mm dia and above RCC NP-3 class sewer.
iii. 58 Rmt of 1800mm dia & above MS Casing pipe through Trenchless Technology.
iv. 3364 Cum of RCC M25 and above.
v. 35 Rmt of MWSL (Machine Wounded Spiral Lining).

c) DELETED

d) DELETED

0 3.3 Each Tenderer should further demonstrate:

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a. DELETED

b. Liquid assets and /or availability of credit facilities of not less than **Rs.560.70lakh** (Credit lines/letter of credit/certificates from Nationalized / Schedule banks in India for meeting the fund requirement etc.,

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3.4 To qualify for a package of contracts made up of this and other contracts for which tenders are invited in this IFT, the tenderer must demonstrate having experience and resources to meet the aggregate of the qualifying criteria for the individual contracts.

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3.5 Sub-contractors experience and resources shall not be taken into account in determining the Tenderers compliance with the qualifying criteria except to the extent stated in 3.2 above.

3.6 Tenderers who meet the above specified minimum qualifying criteria, will only be qualified, if their available tender capacity is more than the total tender value. The available tender capacity will be calculated as under:

a) **Assessed available tender capacity = (A*N*1.5 - B)>= Rs. 4205.22 lakh**

where

A = Maximum value of civil engineering works executed in any one year during the last five years (updated to 2023-24 price level at 10% per year) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which tenders are invited.

B = Value, at 2023-24 price level, of existing commitments and on-going works to be completed during the next **30 months.**

Note: The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Employer in charge, not below the rank of an Executive Engineer or equivalent.

3.7 Even though the Tenderers meet the above criteria, they are subject to be disqualified if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and/or
- participated in the previous Tender for the same work and had quoted unreasonably high tender prices and could not furnish rational justification.

4. One Tender per Tenderer:

4.1 Each tenderer shall submit only one tender for one package. A tenderer who submits or participates in more than one tender (other than as a

sub-contractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Tenderer's participation to be disqualified.

5. Cost of Tendering:

5.1 The tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will in no case be responsible and liable for those costs.

6. Site visit:

6.1 The Tenderer at his own responsibility and risk is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Tenderers own expense.

B. Tender documents

7. Content of Tender documents

7.1 The set of tender documents shall have all the Sections given in Page 2:

7.2 Both the sets should be completed and uploaded with the tender.

8. Clarification of Tender Documents

8.1 A prospective tenderer requiring any clarification of the tender documents may notify the Employer by posting in the web site (Kppp potal →My tenders→action→queries). No identity of the participating tenderer shall be mentioned in the query. All queries & replies can be viewed by all participating tenderers.

8.2 Pre-tender meeting:

8.2 Pre-tender meeting:

8.2.1 The tenderer or his authorized representative is invited to attend a pre-tender meeting which will take place at Office of the Chief Engineer (WWM)-West, Bangalore Water Supply & Sewerage Board, 6th floor, Cauvery Bhavan, K.G.Road, Bangalore -560009 on **08.02.2024 at 4.00PM**

8.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

8.2.3 The tenderer is requested to submit any questions in writing or by cable to reach the Employer not later than one week before the meeting.

8.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of enquiry) and the responses given will

be transmitted through KPPP without delay to all purchasers of the tender documents. Any modification of the tender documents listed in Sub-Clause 7.1 which may become necessary as a result of the pre-tender meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 9 and not through the minutes of the pre-tender meeting.

8.2.5 Non-attendance at the pre-tender meeting will not be a cause for disqualification of a tenderer.

9. Amendment of Tender documents

9.1 Before the deadline for submission of tenders, the Employer may modify the tender documents by issuing addenda.

9.2 Any addendum thus issued shall be part of the tender documents and shall be posted in the Kppp website for viewing by all the purchasers of the tender documents.

9.3 To give prospective Tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend as necessary the deadline for submission of tenders, in accordance with Sub-Clause 16.2 below.

C. Preparation of Tenders

10. Documents comprising the Tender

10.1.1 The tender submitted in Kppp Portal by the Tenderer shall contain the documents as follows:

a) Scanned copy of Earnest Money Deposit.
b) The form of Tender (in the format indicated in Section 4)
c) Scanned copies of the certificates supporting the Qualification as in Section 3. Any other materials required to be completed and submitted by Tenderers in accordance with these instructions. The documents listed under Sections 3, 4, 6 and 9 shall be filled in without exception. PHOTOCOPIES OF THE DOCUMENTS SHOULD BE NOTARISED.

10.1.2 Rates for the Bill of Quantities (Section 9) shall be quoted at the provision made in the e-procurement website Portal.

10.2 Tenderers submitting tenders together with other contracts stated in the IFT to form a package will so indicate in the tender together with any discounts offered for the award of more than one contract.

11. Tender prices

11.1 The contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Tenderer.

11.2 The Tenderer shall fill in the unit rates in figures for all items of the Works described in the Bill of Quantities. The system will automatically calculate the amount of that item as well as the total Tender value. ***Items for which no rate is entered by the Tenderer will not be paid for by the Employer when executed and shall be deemed covered by the other rates in the Bill of Quantities***

11.3 All duties, taxes, and other levies payable by the contractor under the contract, or for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Tenderer.

11.4 DELETED

12. Tender validity

12.1 Tenders shall remain valid for a period not less than **ninety days** after the deadline date for tender submission specified in Clause 16. A tender valid for a shorter period shall be rejected by the Employer as non-responsive.

12.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the Tenderers may extend the period of validity for a specified additional period. The request and the Tenderers responses shall be made in writing or e-mail. A Tenderer may refuse the request without forfeiting his earnest money deposit. A Tenderer agreeing to the request will not be required or permitted to modify his tender, but will be required to extend the validity of his earnest money deposit for a period of the extension, and in compliance with Clause13 in all respects.

13. Earnest money deposit

13.1 Earnest Money Deposit shall be paid through e-Procurement Portal only using any of the following four modes.

i. Credit Card (Online Payment)
ii. Direct Debit Using Internet Banking (Online Payment)
iii. Remittance at the Bank Counter - Challan (Offline Payment)
iv. NEFT (Offline payment).

13.2 Instruments having fixed validity issued as earnest money deposit for the tender shall be valid for 45 days beyond the validity of the tender.

13.3 Any tender not accompanied by an acceptable earnest money deposit and not secured as indicated in Sub-Clauses 13.1 and 13.2 above shall be rejected by the Employer as non-responsive.

13.4 The earnest money deposit of unsuccessful Tenderers will be returned within 30 days of the end of the tender validity period specified in Sub-Clause 12.1.

13.5 The earnest money deposit of the successful Tenderer will be discharged when the Tenderer has signed the Agreement and furnished the required Performance Security.

13.6 The Earnest money deposit may be forfeited:

a) if the Tenderer withdraws the Tender after tender opening during the period of tender validity;
b) if the Tenderer does not accept the correction of the Tender Price, pursuant to Clause 24; or

c) in the case of a successful Tenderer, if the Tenderer fails within the specified time limit to
   (i) Sign the Agreement; or
   (ii) Furnish the required Security deposit

14. Format and signing of Tender

14.1 The completed tender comprising of documents indicated in ITT 10, should be uploaded in the e-Procurement website along with scanned copies of requisite certificates those are mentioned in different sections in the bid document and scanned copy of tender Security / EMD.

14.2 All the documents should be uploaded in e-Procurement website. Tenderer should take a print out of the Form of Tender in the Section 4 of the tender document on company letter head and should sign, stamp and upload the same to the tender. Authenticity of the singing authority shall be furnished. With this, it is taken that tenderer has signed & submitted the tender.

14.3 The Tender shall contain no alterations or additions, except those to comply with instructions issued by the Employer.

D. Submission of Tenders

15. Up-loading & submission of tenders

15.1 The tenders should be uploaded only through e-Procurement Website. Tender should contain

A. Technical Tender consisting of following:

a. All the documents with required details in prescribed format; those are mentioned in different sections in the Tender. Form of Tender, etc., shall be downloaded, filled with required details, signed, scanned & uploaded to the e-Procurement Portal (www.Kppp.karnataka.gov.in)

b. The above documents along with notarized copies of documentary evidences as indicated in Section—2 of ITT, Section-3 Qualification information & Section-4 Forms of Tender shall be scanned and uploaded to the website compulsorily, failing which tender will be rejected in view of incomplete tender document and

B. Financial Tender consisting of Bill of Quantities

15.1 All rates for the items in the Schedule shall be posted in the work template provided in the tender document. Rates shall be entered in figures only.

15.2 DELETED

15.3 BID reference Number will be automatically generated by the server.

15.4 DELETED

16. Deadline for submission of the Tenders

16.1 DELETED.

16.2 The Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Clause 9, in which case all rights and obligations of the Employer and the Tenderers previously subject to the original deadline will then be subject to the new deadline.

17. Late Tenders

17.1 The software of e-Procurement website system will not allow the Tenderer to upload the documents after expiration of the stipulated date & time of Bid submission. The Tenderer shall refer the server time, which will be displayed in the Kppp Portal. BWSSB will not be responsible for non-receipt of bids on the stipulated date & time prescribed in clause 16, due to Internet Problems, improper uploading or any other related problems. In case of connectivity problems, Tenderer may contact Helpdesk of the Kppp Portal service provider and may also draw the attention of tender inviting authority.

18. Modification and Withdrawal of Tenders

18.1 Tenderers may "modify" and "withdraw" their tenders multiple numbers of times, until the deadline for submission of tenders by operating the relevant provision made in Kppp Portal. If the Tenderer withdraws the tender before the deadline for submission of tenders and later if he is interested to submit the tender once again, may do so within the stipulated date & time as mentioned in Clause 16. In this case within the stipulated date & time, the tenderer can once again submit the requisition to the officer inviting tenders for access to the withdrawn tender document for resubmission. For this tenderer need not make any additional payment towards the cost of tender document. Communication of modification / withdrawal by other means will not be accepted.

18.2 DELETED

18.3 No Tender may be modified after the deadline for submission of Tenders.

18.4 Withdrawal or modification of a Tender between the deadline for submission of Tenders and the expiration of the original period of Tender validity specified in Clause 12.1 above or as extended pursuant to Clause 12.2 may result in the forfeiture of the earnest money deposit pursuant to Clause 13.

18.5 DELETED

E. Tender opening and evaluation

19. Opening of Technical Bid of Tenders and evaluation to determine qualified Tenderers:

19.1 The Employer will open the Technical details of all the Tenders received (except those withdrawn), including modifications made pursuant to Clause 18, in the presence of the Tenderers or their representatives who choose to attend at the Employer's office mentioned in the earlier para at 15:00 hours on the date and the place specified. In the event of the specified date of Tender opening being declared a holiday for the Employer, the Tenders will be opened at the appointed time and location on the next working day.

19.2 WITHDRAWAL proposal submitted pursuant to clause 18 shall be read out first and their bids shall not be opened.

19.3 The Tenderers names, the presence or absence of earnest money deposit (amount, format and validity), the submission of qualification information and such other information as the Employer may consider appropriate will be announced by the Employer at the opening.

19.4 The Employer shall prepare minutes of the Tender opening, including the information disclosed to those present in accordance with Sub-Clause 19.3.

19.5 The Price Tenders of all the Tenderers including modifications for financial tenders cannot be opened as this is programmed to open later after evaluation of the Technical details of the participating Tenderers.

19.6 The Employer will evaluate and determine whether each tender (a) meets the eligibility criteria defined in ITT Clause 2; (b) is accompanied by the required earnest money deposit as per stipulations in ITT Clause and (c) meets the minimum qualification criteria stipulated in ITT Clause 3. The Employer will draw out a list of qualified Tenderers.

20. Opening of Financial Bid of qualified Tenderers and evaluation:

20.1 The Employer will inform all the Qualified Tenderers the time, date and venue fixed for the opening of the price Tenders. The Employer will open the price tender of Qualified Tenderers at the appointed time and date in the presence of the Tenders or their representatives who choose to attend. In the event of the specified date of Price tender opening being declared a holiday for the Employer, the price tenders will be opened at the appointed time and location on the next working day.

20.2 DELETED

20.3 The Tenderers' names, the Tender prices, the total amount of each Tender, any discounts, and withdrawals, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. No Tender shall be rejected at Tender opening.

20.4 The Employer shall prepare minutes of the Price Tender opening, including the information disclosed to those present in accordance with Sub-Clause 20.3.

21. Process to be confidential

21.1 Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer has been announced. Any effort by a Tenderer to influence the Employer's processing of Tenders or award decisions may result in the rejection of his Tender.

22. Clarification of Tenders

22.1 To assist in the examination, evaluation, and comparison of Tenders, the Employer may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the Tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Tenders in accordance with Clause 24.

22.2 Subject to sub-clause 22.1, no Tenderer shall contact the Employer on any matter relating to its Tender from the time of the Tender opening to the time the contract is awarded. If the Tenderer wishes to bring additional information to the notice of the Employer, it should do so in writing.

22.3 Any effort by the Tenderer to influence the Employer in the Employer's Tender evaluation, Tender comparison or contract award decisions may result in the rejection of the Tenderers' Tender.

23. Examination of Tenders and determination of responsiveness

23.1 Prior to the detailed evaluation of Tenders, the Employer will determine whether each Tender; (a) has been properly signed; and; (b) is substantially responsive to the requirements of the Tender documents like (a)Form of Tender, (b)Declaration statement Scanned/ uploaded [including documents those are required to be furnished as per Section 2, 3 & 4 of the tender,]; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the tendering documents.

23.2 A substantially responsive Tender is one which conforms to all the terms, conditions, and specifications of the Tender documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Tender documents, the Employer's rights or the Tenderer's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

23.3 If a Tender is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non conforming deviation or reservation.

24. Correction of errors

24.1 Once the Tenderer key in the rates in figures, in the Bill of quantities provided, the system will automatically calculate the amount of that item as well as the total Bid value.

24.2 Deleted

25. Evaluation and comparison of Tenders

25.1 The Employer will evaluate and compare only the Tenders determined to be substantially responsive in accordance with Clause 23.

25.2 In evaluating the Tenders, the Employer will determine for each Tender the evaluated Tender Price by adjusting the Tender Price as follows:

(a) Making any correction for errors pursuant to Clause 24; and

(b) DELETED

25.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Tender documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Tender evaluation.

25.4 DELETED

25.5 If the tender of the successful tenderer is seriously unbalanced in relation to the Employer's estimate of the cost of the work to be performed under the contract, the Employer may require the Tenderer to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 29 be increased at the expense of the successful Tenderer to a level sufficient to protect the Employer against financial loss in the event of default of the successful under the contract.

F. Award of Contract

26. Award criteria

26.1 Subject to Clause 27, the Employer will award the Contract to the Tenderer whose Tender has been determined to be substantially responsive to the Tender documents and who has offered the lowest evaluated Tender Price, provided that such Tenderer has been determined to be (a) eligible in accordance with the provisions of Clause 2, and (b) qualified in accordance with the provisions of Clause 3.

27. Employer's right to accept any Tender and to reject any or all Tenders

27.1 Notwithstanding Clause 26, the Employer reserves the right to accept or reject any Tender, and to cancel the Tender process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected Tenderer or Tenderers of the grounds for the Employer's action.

28. Notification of award and signing of Agreement

28.1 The Tenderer whose Tender has been accepted will be notified of the award by the Employer prior to expiration of the Tender validity period by writing, e-mail or by registered letter. This letter (hereinafter and in the

Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

28.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of Security deposit in accordance with the provisions of Clause 29.

28.3 The Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will be kept ready for signature of the successful Tenderer in the office of Employer within 30 days following the notification of award along with the Letter of Acceptance. Within 20 days of receipt, the successful Tenderer will sign the Agreement and deliver it to the Employer.

28.4 Upon the furnishing by the successful Tenderer of the Performance Security, the Employer will promptly notify the other Tenderers that their Tenders have been unsuccessful.

29. Security deposit

29.1 Within 20 days of receipt of the Letter of Acceptance, the successful Tenderer shall deliver to the Employer a Security deposit in any of the forms given below for an amount equivalent to 5% of the Contract price plus additional security for unbalanced tenders in accordance with Clause 25.5 of ITT and Clause 44 of the Conditions of Contract. :

- A bank guarantee in the form given in Section 10;

29.2 If the security deposit is provided by the successful Tenderer in the form of a Bank Guarantee, it shall be issued either by a Nationalized/Scheduled bank and valid in accordance with Clause 43 of Condition of Contract.

29.3 DELETED

29.4 Failure of the successful Tenderer to comply with the requirements of Sub-Clause 29.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Earnest money deposit.

30. DELETED

31. Corrupt or Fraudulent practices

31.1 The GOK requires that the Tenderers/Suppliers/Contractors, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, GOK :

a) will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

b) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a GOK contract if it at any time determines that the

firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a GOK contract.

31.2 Furthermore, Tenderers shall be aware of the provision stated in sub-clause 50.2 of the Conditions of Contract.

Sd/-

Chief Engineer (WWM-W)

(Waste Water

SECTION 3:

QUALIFICATION INFORMATION

The following form is to be downloaded, particulars are to be filled, scanned & uploaded by the Tenderer.

The information to be filled in by the Tenderer hereunder will be used for purposes of computing Tender capacity as provided for in Clause 3 of the Instructions to Tenderers. This information will not be incorporated in the Contract.

1.1 Constitution or legal status of Tenderer [Attach copy]
Place of Registration _____
(Attach Copy)
Principal place of business: _____

1.2 Total value of civil engineering construction works executed and payments received in the last five years (in Rs. Lakh) [attach certificate of Chartered accountant]

2018 - 19
2019 – 20
2020 – 21
2021 – 22
2022 – 23

1.3 Work performed as Prime Contractor (in the same name) on works of similar nature over during the five years specified in 1.2 above.

Project Name	Name of Employer	Description of Work	Contract Number	Value of contract Rs. Lakh	Date of issue of work order	Specified period of completion	Actual date of completion	Remarks explaining reasons for delay in completion of work
1	2	3	4	5	6	7	8	9

1.4 Quantities of work executed as prime contractor (in the same name) during the last five years specified in 1.2 above: [to support the qualification criteria in ITT clause 3]

Year	Name of Work	Name of Employer	Quantity of work performed (cum)		Remarks (Indicate contract reference)

1.5 Information on works for which Tenders have been submitted and works which are yet to be completed as on the date of this Tender.

(A) Existing commitments and on-going works:

Description of Work	Place & State	Contract No. & Date	Name and Address of Employer	Value of Contract (Rs. Lakh)	Stipulated period of completion	Value of works remaining to be completed (Rs. Lakh)	Anticipated date of completion
1	2	3	4	5	6	7	8

(B) Works for which Tenders already submitted:

Description of Work	Place & State	Name and Address of Employer	Estimated value of works (Rs. Lakh)	Stipulated Date period of completion	when decision is expected	Remarks if any
1	2	3	4	5	6	7

1.6 Items of equipment essential for carrying out the works.

Item of Equipment	Requirement			Owned and available		Remarks
	No.	Capacity	Owned	Number/ Capacity	Age/ Condition	

1.7 Reports on the financial standing of the tenderer, such as profit and loss statements and auditor’s reports for the last five years;

1.8 Qualification and experience of the key technical and management personnel in permanent employment with the tenderer and those that are proposed to be deployed on this contract, if awarded.

1.9. Name, address, and telephone, telex, and fax numbers of the Tenderers' bankers who may provide references if contacted by the Employer.

1.10 Evidence of access to financial resources to meet the qualification requirement specified in ITT Clause3.3 (b): Cash in hand, Letter of Credit etc. List them below and attach certificate from the Banker in the suggested format as under:

BANKER'S CERTIFICATE

This is to certify that M/s. ..... is a reputed company with a good financial standing. If the contract for this work, namely ..... (name of the work) is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. ..... to meet the working capital requirements for executing the above contract

Sd/-
Name of the Bank, Senior Bank Manger
Address:
.....

1.11 Proposals for subcontracting components of works amounting to more than 20% of the contract price .

Item of Work	Value of Sub-Contract	Identified Sub-Contractor (Name and address)	Experience of similar work

1.12 Information on litigations in which the Tenderer is involved:

Other Party (ies)	Employer	Details of dispute	Amount involved	Remarks showing present status

1.13 The proposed methodology and program of construction, backed with equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

Sd/-

Chief Engineer

(Waste Water Management-W)

SECTION 4:

[Tenderer shall down load this page, print on the letter head, fill the gaps with signature, scan the sheet & upload to the website. Failing which the tender will be treated as non-responsive]

FORMS OF TENDER, LETTER OF ACEPTANCE, NOTICE TO PROCEED WITH THE WORK AND AGREEMENT FORM

Form of Tender

Description of the Work: **Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge**

To

The Chief Engineer (Waste Water Management-West)
Bangalore Water Supply & Sewerage Board
6th Floor, Cauvery Bhavan D-Block,
K.G. Road, Bangalore 560009

GENTLEMEN,

We offer to execute the Works described above in accordance with the Conditions of Contract accompanying this Tender for the Contract Price uploaded for this tender to be opened after qualification.

This Tender and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Tender you receive.

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely “Prevention of Corruption Act 1988”.

We hereby confirm that this Tender complies with the Tender validity and Earnest money deposit required by the Tender documents.

We attach herewith our current income-tax clearance certificate.

Yours faithfully,

Authorized Signature:

Name & Title of Signatory:

_____

Name of Tenderer _____

Address: ----------

Letter of Acceptance
(letterhead paper of the Employer)

_____[date]

To:
_____[name and address of the Contractor]

Dear Sirs,

This is to notify you that your Tender dated _____ for execution of the _____[name of the contract and identification number, as given in the Instructions to Tenderers] for the Contract Price of Rupees _____ —— _____ (_____) [amount in words and figures], as corrected and modified in accordance with the Instructions to Tenderers is hereby accepted by our Agency.

You are hereby requested to furnish Security deposit plus additional security for unbalanced tenders in terms of Clause 25.5 of ITT, in the form detailed in Clause 29.1 of ITT for an amount of Rs.————— within 20 days of the receipt of this letter of acceptance valid up to 30 days from the date of expiry of Defects Liability Period i.e. up to ..... and sign the contract, failing which action as stated in Para 29.4 of ITT will be taken.

Yours faithfully,

Authorized Signature
Name and Title of Signatory
Name of Agency

Issue of Notice to proceed with the work
(letterhead of the Employer)

————— (date)

To
————————————— (name and address of the Contractor)
—————————————
—————————————

Dear Sirs:

Pursuant to your furnishing the requisite security deposit as stipulated in ITT Clause 29.1 and signing of the contract agreement for the construction of ———————[name of the contract] a Tender Price of Rs.———————, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of signatory authorized to sign on behalf of Employer)

Agreement Form
Agreement

This agreement, made the _____day of _____20_____, between_____ _____[name and address of Employer] (hereinafter called "the Employer") of the one part and _____ _____ _____ _____[name and address of contractor] (hereinafter called "the Contractor") of the other part.

Whereas the Employer is desirous that the Contractor execute _____ _____[name and identification number of Contract] (hereinafter called "the Works") and the Employer has accepted the Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein at a contract price of Rupees.....

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.

2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:
   i) Letter of Acceptance;
   ii) Notice to proceed with the works;
   iii) Contractor's Tender;
   iv) Contract Data;
   v) Conditions of contract (including Special Conditions of Contract);
   vi) Specifications;

vii) Drawings;
viii) Bill of Quantities; and
ix) Any other document listed in the Contract Data as forming part of the contract.

Whereas, the parties now mutually agree to the following conditions of Contract.

5. Jurisdiction of Courts/Arbitration: The Sitting of arbitration shall be held at Bangalore only and nowhere else.
6. Dispute of any kind arising out of the contract shall be resolved within the jurisdiction of Bangalore city only and the parties agree and clearly understand that the courts/ tribunals situated at Bangalore Metropolitan City have exclusive jurisdiction for the redressal of the disputes arising out of the contract and at no other place.
7. The parties further agree and understand that the place or places of issue of bank guarantee other than Bangalore will have no jurisdiction to resolve dispute of any kind relating to enforcement of the bank guarantees submitted by the contractor at Bangalore for the execution of the contract at Bangalore.
8. The contractor shall comply with all the legal requirements in the matter of employment of workmen and provide all safety gadgets to the workmen while working in the hazards place of conditions during the execution of the contract.
9. Contractor shall be fully responsible in the event of death of employee/ workman during the execution of the work and liable to pay adequate compensation to the dependants of employee/ workman as per law.
10. On his/ their failure, if the Board is made to pay compensation the same shall be recovered by the Board from the contractor out of the amounts due to the contractor or by appropriate legal action.
11. If death of any employees occurs during execution of work due to negligence of contractor, the contract will be liable for termination.
12. In the event of such termination, the employer may consider blacklisting of firm after due notice.
13. In case of any death or accident the contract will be cancelled after following due process.

14. The Board will be entitled to claim exemplary damages from the contractor in case of death of any work man / employees of the contractor in any of the BWSSB works as it damages the reputation of

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____
was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said _____
in the presence of:

Binding Signature of Employer _____

Binding Signature of Contractor _____

SECTION 5: CONDITIONS OF CONTRACT

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Conditions of Contract

A. General

1. Definitions

1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Bold letters are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Tender.

Compensation events are those defined in Clause 38 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Employer in accordance with Sub Clause 46.1.

The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.2 below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body whose Tender to carry out the Works has been accepted by the Employer.

The **Contractor's Tender** is the completed Tender document submitted by the Contractor to the Employer.

The **Contract price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects liability period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Initial Contract price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an extension of time.

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The **Site** is the area defined as such in the Contract Data.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Employer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

A **Variation** is an instruction given by the Employer which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Employer will provide instructions clarifying queries about the Conditions of Contract.

2.2 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement
(2) Letter of Acceptance, notice to proceed with the works
(3) Contractor’s Tender
(4) Contract Data
(5) Conditions of Contract
(6) Specifications
(7) Drawings
(8) Bill of quantities and
(9) any other document listed in the Contract Data as forming part of the Contract.

3. Law governing contract

3.1 The law governing the Contract is the Laws of India supplanted by the Karnataka Local Acts.

4. Employer's decisions

4.1 Except where otherwise specifically stated, the Employer will decide contractual matters between the Employer and the Contractor.

5. Delegation

5.1 The Employer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Subcontracting

7.1 The Contractor may subcontract with the approval of the Employer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer.

9. Personnel

9.1 The Contractor shall employ the technical personnel (of number and qualifications) as may be stipulated by GOK from time to time during the execution of the work. The technical staff so employed shall be available at site as may be stipulated by the Employer.

9.2 If the Employer asks the Contractor to remove a person who is a member of the Contractor’s staff or his work force stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Employer’s and Contractor's risks

10.1 The Employer carries the risks which this Contract states are Employer’s risks, and the Contractor carries the risks which this Contract states are Contractor’s risks.

11. Employer's risks

11.1 The Employer is responsible for the excepted risks which are:

(a) Rebellion, riot commotion or disorder unless solely restricted to employees of the Contractor or his Sub-Contractors arising from the conduct of the Works; or

(b) A cause due solely to the design of the Works, other than the Contractor’s design; or

(c) any operation of the forces of nature (in so far as it occurs on the Site) which an experienced contractor:

(i) could not have reasonably foreseen; or

(ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures;
(A) prevent loss or damage to physical property from occurring by taking appropriate measures or
(B) insure against such loss or damage

12. Contractor's risks

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. Insurance:

13.1 The Contractor shall prior to commencing the works, effect and thereafter maintain insurances , in the joint names of the Employer and the Contractor, (cover from the first working day after the Start Date to the end of Defects Liability Period), in the amounts stated in the Contract Data :
(a) for loss of or damage to the Works, Plants and Materials and the Contractor's equipment;
(b) for liability of both Parties for loss, damage, death and injury to third parties or their property arising out of the Contractor's performance of the Contract including the Contractor's liability for damage to the Employer's property other than the Works and
(c) for liability of both Parties and of any Employer's representative for death and injury to the Contractor's personnel except to the extent that liability arises from the negligence of the Employer, any Employer's representative or their Employees.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Employer for his approval before the Start Date. All such insurance shall provide for compensation to be payable to rectify the loss or damage incurred. All payments received from insurers relating to loss or damage shall be held jointly by the Parties and used for the repair of the loss or damage or as compensation for loss or damage that is not to be repaired.

13.3 If the Contractor fails to effect or keep in force any of the insurances referred to in the previous sub-clauses or fails to provide satisfactory evidence, policies or receipts, the Employer may without prejudice to any other right or remedy, effect insurance for the cover relevant to such default and pay the premiums due and recover the same as a deduction from any other monies due to the Contractor. If no payments is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Employer.

13.5 Both Parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports:

14.1 The Contractor, in preparing the tender, shall rely on any site investigation reports referred to in the Contract data, supplemented by any information available to the Tenderer.

15. Queries about the Contract Data

15.1 The Employer will clarify queries on the Contract Data.

16. Contractor to construct the Works

16.1 The Contractor shall construct the Works in accordance with the Specification and Drawings.

17. The Works to be completed by the Intended Completion Date

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Employer, and complete them by the Intended Completion Date.

18. Approval by the Employer:

18.1 The Contractor shall submit Specification and drawings showing the proposed Temporary Works to the Employer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for the design of Temporary Works

18.3 The Employer’s approval shall not alter the Contractor’s responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of third parties to the design of the temporary Works where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Employer before their use.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Employer of such discoveries and carry out the Employer's instructions for dealing with them.

21. Possession of the Site

21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

22. Access to the Site

22.1 The Contractor shall allow the Employer and any person authorized by the Employer access to the Site, to any place where work in

connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

23. Instructions

23.1 The Contractor shall carry out all instructions of the Employer which comply with the applicable laws where the Site is located.

24. Procedure for resolution of Disputes:

24.1 If the Contractor is not satisfied with the decision taken by the Employer, the dispute shall be referred by either party to Arbitration within 30 days of the notification of the Employer's decision.

24.2 If neither party refers the dispute to Arbitration within the above 30 days, the Employer's decision will be final and binding.

24.3 The Arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

B. Time Control

25. Program

25.1 Within the time stated in the Contract Data the Contractor shall submit to the Employer for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works.

25.2 The Employer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Employer again at any time. A revised Program is to show the effect of Variations and Compensation Events.

26. Extension of the Intended Completion Date

26.1 The Employer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

26.2 The Employer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Employer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information.

27. Delays ordered by the Employer

27.1 The Employer may instruct the Contractor to delay the start or progress of any activity within the Works.

28. Management meetings

28.1 The Employer may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the progress achieved and the plans for remaining work.

28.2 The responsibility of the parties for actions to be taken is to be decided by the Employer either at the management meeting or after the management meeting and stated in writing to be distributed to all who attended the meeting.

C. Quality Control

29. Identifying defects

29.1 The Employer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Employer may instruct the Contractor to search for a Defect and to uncover and test any work that the Employer considers may have a Defect

30. Tests

30.1 If the Employer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

31. Correction of defects

31.1 The Employer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

31.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Employer’s notice.

32. Uncorrected defects

32.1 If the Contractor has not corrected a Defect within the time specified in the Employer’s notice, the Employer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

1

2 D. Cost Control

33. Bill of Quantities (BOQ)

33.1 The BOQ shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

33.2 The BOQ is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the BOQ for each item

34. Variations

34.1 The Employer shall have power to order the Contractor to do any or all of the following as considered necessary or advisable during the progress of the work by him

(a) Increase or decrease of any item of work included in the Bill of Quantities (BOQ);
(b) Omit any item of work;
(c) Change the character or quality or kind of any item of work;
(d) Change the levels, lines, positions and dimensions of any part of the work;
(e) Execute additional items of work of any kind necessary for the completion of the works; and
(f) Change in any specified sequence, methods or timing of construction of any part of the work.

34.2 The Contractor shall be bound to carry out the work in accordance with any instructions in this connection, which may be given to him in writing by the Employer and such alteration shall not vitiate or invalidate the contract.

34.3 Variations shall not be made by the Contractor without an order in writing by the Employer, provided that no order in writing shall be required for increase or decrease in the quantity of an item appearing in the BOQ so long as the work executed conforms to the approved drawings.

34.4 The Contractor shall promptly request in writing the Employer to confirm verbal orders and if no such confirmation is received within 15days of request, it shall be deemed to be an order in writing by the Employer.

35. Payments for Variations

35.1 Payment for increase in the quantities of an item in the BOQ up to 25% of that provided in the Bill of Quantities shall be made at the rates quoted by the Contractor.

35.2 For quantities in excess of 125% of the tendered quantity of an item as given in the BOQ, the Contractor shall be paid at the rate entered in or derived from in the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract.

35.3 If there is no rate for the additional, substituted or altered item of the work in the BOQ, efforts would be made to derive the rates from those given in the BOQ or the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) and if found feasible the payment would be made at the derived rate for the item plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract

35.4 If the rates for additional, substituted or altered item of work cannot be determined either as at 35.1 or 35.2 or 35.3 above, the Contractor shall be requested to submit his quotation for the items supported by analysis of the rate or rates claimed, within 7 days.

35.5 If the Contractor's quotation is determined unreasonable, the Employer may order the Variation and make a change to the Contract Price which shall be based on Employer's own forecast of the effects of the Variation on the Contractor's costs.

35.6 If the Employer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

35.7 Under no circumstances the Contractor shall suspend the work on the plea of non-settlement of rates for items falling under this Clause.

36. Submission of bills for payment

36.1 The Contractor shall submit to the Employer monthly bills of the value of the work completed less the cumulative amount paid previously.

36.2 The Employer shall check the Contractor's bill and determine the value of the work executed which shall comprise of (i) value of the quantities of the items in the BOQ completed and (ii) valuation of Variations and Compensation Events.

36.3 The Employer may exclude any item paid in a previous bill or reduce the proportion of any item previously paid in the light of later information.

37. Payments

37.1 Payments shall be adjusted for deductions for advance payments, other recoveries in terms of the contract and taxes, at source, as applicable under the law. The Employer shall pay the Contractor the within **60 days** of submission of bill. The Contractor shall be liable to pay liquidated damages for shortfall in progress. For Progress beyond the agreed Programme, payment is subject to availability of the grants.

37.2 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

38. Compensation events

38.1 The following are Compensation events unless they are caused by the Contractor:

(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.
(b) The Employer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
(c) The Employer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
(d) The Employer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
(e) The effect on the Contractor of any of the Employer's Risks.

(f) The Employer unreasonably delays issuing a Certificate of Completion.
(g) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

38.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date is extended. The Employer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

38.3 As soon as information demonstrating the effect of each Compensation event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Employer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Employer shall adjust the Contract Price based on Employer’s own forecast. The Employer will assume that the Contractor will react competently and promptly to the event.

38.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Employer.

39. Tax

39.1 Taxes, Duties and other Levies:

a) The selected bidder will be fully responsible for all applicable taxes, duties, license fees, etc. incurred in relation to the work. They must cover the taxes that may be imposed on their own personnel or any of their employees' earnings and will be expected to protect the employer from any potential claims made against them. The selected bidder must indemnify and hold the employer harmless against any such claims.

b) According to Commercial Tax Department Notification No.12/2017, all services are subject to a nil rate of GST under the definition of a pure service. The quoted rate should exclude the GST, which will be charged separately as per the prevailing applicable laws.

c) BWSSB does not assume any responsibility for taxes under the Indian Income Tax Act, 1961 for the selected bidder(s) or their personnel. In accordance with the provisions of the Indian Income Tax Act, 1961, if necessary, BWSSB will make deductions for Income Tax at source. The applicable tax at the prevailing rate will be included over and above the quoted price.

If the Amount put to tender is exclusive of GST

GST and TDS Clause:
Prevailing GST:
The prevailing Goods and Services Tax (GST) rate is 18% as per the current taxation regulations. The GST amount is not included in the bid

amount put forward by the bidder but will be applicable in addition to the awarded contract cost.

TDS Deduction:
As per the GST notification, a Tax Deducted at Source (TDS) of 2% shall be deducted by the client while making payments for the bills raised by the bidder.

Submission of Security Deposit:
Upon issuance of the Letter of Award (LOA) at the award cost, including GST, the successful bidder shall be required to submit the entire security deposit, comprising the applicable GST amount as well.

Invoicing and Tax Compliance:
The successful bidder shall adhere to all relevant GST regulations and guidelines while invoicing for the work contract. The invoice/bills provided by the bidder should clearly indicate the applicable GST rate, along with the tax registration details, and comply with all legal requirements as specified by the GST authorities.

Changes in GST Rate:
In the event of any change in the GST rate during the execution of the contract, the responsibility of updating the invoicing and pricing structure to reflect the revised GST rate shall lie with the bidder. The contract shall remain in force, and both parties shall abide by the new GST rate as per the applicable law.

GST Documentation:
The bidder is required to provide all necessary GST-related documentation, such as tax invoices, payment receipts, and any other documents requested by the contracting authority, in a timely and accurate manner.

Any disputes or issues related to GST:
In case of any disputes or issues related to GST compliance, the bidder shall be responsible for resolving such matters with the appropriate tax authorities. The contracting authority shall not bear any liability for any non-compliance or discrepancies related to GST.

This provision is an integral part of the bid document, and all bidders are requested to thoroughly review and acknowledge their understanding and compliance with the prevailing GST rate of 18% before submitting their bids.

40. Price Adjustment:

40.1 Contract price shall be adjusted for increase or decrease in rates and prices of materials, fuels and lubricants in accordance with the following principles and procedures and as per formulae given in the Contract Data.

1 (a) The price Adjustment shall apply for the work done from the date of commencement up to the end of original period of completion or extensions granted by the Employer and shall not apply to work carried out beyond the stipulated period of completion for reasons attributable to the Contractor;

2

3 (b) Price Adjustment shall be admissible from the date of opening of tenders (original or extended)

4 (c) The price adjustment shall be determined during each quarter from the formulae given in Contract Data.

5 (d) Following expressions and meanings are assigned to the work done during the quarter:

R = Total value of work done during the quarter. It will exclude value for works executed under variations for which price adjustment (if any) will be worked out separately based on the terms mutually agreed.

40.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other Clauses in the Contract, the unit rates included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

41. Liquidated damages

41.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the Contract Data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

41.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Employer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment of bill.

42. DELETED

43. Securities:

43.1 The Security deposit (including additional security for unbalanced tenders) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and type of instrument acceptable to the Employer. The Security deposit shall be valid until a date 30 days from the date of expiry of Defects Liability Period and the additional security for unbalanced tenders shall be valid until a date 30 days from the date of issue of the certificate of completion.

44. Cost of Repairs:

44.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

45. Completion

45.1 The Contractor shall request the Employer to issue a Certificate of Completion of the Works and the Employer will do so upon deciding that the Work is completed.

46. Taking over

46.1 The Employer shall take over the Site and the Works within seven days of issuing a certificate of Completion.

47. Final account

47.1 The Contractor shall supply to the Employer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 90 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer shall issue within 90 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Employer shall decide on the amount payable to the Contractor and make payment within 60 days of receiving the Contractor's revised account.

48. As built drawings and /or Operating and Maintenance Manuals

48.1 If "as built"[1] Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

48.2 If the Contractor does not supply the Drawings by the dates stated in the Contract Data, or they do not receive the Employer's approval, the Employer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

49. Termination

49.1 The Employer may terminate the Contract if the other party causes a fundamental breach of the Contract.

49.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) the Contractor stops work for 45 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Employer;

(b) the Employer instructs the Contractor to delay the progress of works and the instruction is not withdrawn within 60 days;

(c) The Contractor becomes bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

[1] Completion Drawings

(d) a payment due to the Contractor is not paid by the Employer within 90 days of the date of the submission of the bill by the Contractor.

(e) the Employer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Employer;

(f) the Contractor does not maintain a security which is required;

(g) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and

(h) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in the executing the Contract. For the purpose of this paragraph : "corrupt practice" means the offering, giving, receiving or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition."

49.3 When either party to the Contract gives notice of a breach of contract to the Employer for a cause other than those listed under Sub Clause 49.2 above, the Employer shall decide whether the breach is fundamental or not.

49.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

49.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

50. Payment upon Termination

50.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Employer shall prepare bill for the value of the work done less advance payments received up to the date of the bill, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

50.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Employer shall prepare bill for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting

and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract, and less taxes due to be deducted at source as per applicable law and make payment accordingly.

51. Property

51.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor's default.

52. Release from performance

52.1 If the Contract is frustrated by any event entirely outside the control of either the Employer or the Contractor the Employer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

Sd/-

Chief Engineer

(Waste Water Management-W)

F. Special Conditions of Contract

1. Labour :

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Employer, deliver to the Employer a return in detail, in such form and at such intervals as the Employer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Employer may require.

2. Compliance with labour regulations:

During continuance of the contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, Employer shall have the right to deduct any money due to the Contractor including his amount of security deposit. The Employer shall also have right to recover from the Contractor any sum required or estimated to be

required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

3. Protection of Environment:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

4. Arbitration (Clause 24)

4.1 General Conditions of Dispute Adjudication Board Agreement.

If any dispute arises between the parties in connection with, or arising out of , the Contract or the execution of the works shall be adjudicated by the DBA comprising of 3 members constitute by:

a. Additional Chief Engineer, BWSSB as Employer representative,
b. The " Contractor", and
c. The "Member" third party who is being identified/nominated jointly by both Employer and Contractor.

If either party is dissatisfied with the DAB's decision, then either Party may, within 28days after receiving the decision, give Notice to the other party of its dissatisfaction. If the DAB fails to give its decision within period prescribed, then either party may, within 28 days after this period has expired, give Notice to the other Party of its dissatisfaction. Then only the procedure of 4.2 shall be initiated.

4.2 The procedure for arbitration shall be as follows:

(a) In case of dispute or difference arising between the Employer and the Contractor relating to any matter arising out of or connected with this agreement it shall be settled in accordance with the Arbitration and Conciliation Act 1996. The disputes or differences shall be referred to a Sole Arbitrator. The Sole Arbitrator shall be appointed by agreement between the parties; failing such agreement, by the Appointing Authority (any one of the Organizations as per list enclosed in Annexure)

(b) Arbitration proceedings shall be held at ***Bangalore***, Karnataka, India

(c) The cost and expenses of arbitration proceedings will be paid as determined by the Arbitrator. However the expenses incurred by each party in connection with the preparation, presentation, etc., shall be borne by each party itself.

(d) Performance under the contract shall continue during the arbitration proceedings and payments due the Contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.

5 Contractor to Co-ordinate his Work with Other Contractors

5.1 The Contractor has to co-ordinate with the other concerned Contractors as already specified in Conditions of Contract for all such works as per the directions of Engineer in charge at no extra cost.

6 **Continuation of Work:**

6.1 In case of the death of a contractor after executing the agreement / commencement of the work, his legal heir, if any eligible registered contractor and willing, can execute and complete the work at the accepted tender rates irrespective of the cost of the work

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Annexure:

LIST OF ORGANIZATIONS WHO ARE CONSIDERED AS APPOINTING AUTHORITY FOR APPOINTMENT OF ARBITRATORS

1 1. Indian Council of Arbitration, India;
2 2. International Centre for Alternative Disputes Resolution (India);
3 3. Indian Roads Congress;
4 4. Indian Building Congress;
5 5. Indian Institute of Bridge Engineers;
6 6. Indian Institute of Public Health Engineers;
7 7. Institute of Water Works

7. The Bidder Should not have applied for or are now part of Corporate Debt Restructure (CDR) / SDR in the last 5 Financial Years.
8. The Contractor shall use tertiary treated water from BWSSB wherever available for Construction, Flow testing at the prevailing rates of BWSSB.
9. The Supply of pipes and other materials shall be initially for only 50% of the quantity of BOQ is considered and further supply will be as per the recommendations of the Engineer In-charge based on the requirement.

10. All required permissions/ROW issues from all concerned departments such as NHAI / Railways / any other department shall be obtained from the contractor and Board Engineers will assist for the same. Deposits payable to the departments will be borne by the Board.
11. No Variation work will be executed by the firm unless approval is conveyed from the Competent Authority.
12. The Hard Rock obtained during execution, will not be auctioned by Board (Because of the restriction in stocking of hard rock in site and safety issues). However Rs.70.00 per cum + applicable GST of Hard Rock will be recovered from the firm in Running bills.
13. Designated qualified safety officer/Engineer shall be deployed at site from the firm.
14. The estimated rates for the above work is prepared excluding GST.
15. The contractors are being informed to quote their rate excluding GST. The GST, at the prevailing rate will be reimbursed.
16. The Contractors shall carry out the above UGD work considering the alignment / levels of Sub-mains, mains and trunk Sewers.
17. The Tenderer should have not been black listed by any Central / State Government Institutions in last 3 Financial Years. An undertaking (Self-Certificate) in this regard that the bidder hasn't been blacklisted by any Central / State Government Institution must be submitted.
18. Tenderer should inspect the site to know the existing Utilities, Soak Pits, existing UGD network if any before quoting.
19. Cost towards Restoration of Utilities has to be borne by the Contractor.
20. The Bidder Should not have incurred losses for more than 2 years in last Five financial years.
21. In respect of Conditions of Contract of Section-C-Quality Control, Clause.35 of 35.1 under Payments for Variations for upto 125% of BOQ- The BOQ rates is compared with SR of year of award plus TP rates and lesser among them is considered for quantities exceeding 125% of BOQ in the work slip.
22. As per Conditions of Contract under Clause-18 of Approval by the Employer- The contractor has to carry out the survey and submit the drawing related to laterals, Machine holes and sub-main. After the verification Contractor has to submit 6 sets of drawings for approval. The distribution of drawings by the employer as below:
    Employer-4 Sets

Contractor- 1set.

23. The "As-built" drawing (in scale 1:200) in 2 sets need to be submitted in 2sets both in hard copy and soft copy for approval within 30days of issue of certificate of completion of work by incorporating/updating in the GIS countersigned by PMC and BWSSB officials.

24. The contractor shall visit the site before attending the pre-bid meeting. The queries received after pre-bid meeting will not be entertained.

25. In case of any death or accident the contract will be cancelled after following due process:

1) Any utilities encountered during execution if damaged by the contractor, the same need to be rectified immediately without any delay at his own cost with due approval from the concerned
2) If any undue incidents with respect to non compliance to safety at site per decease, the contractor has to pay Rs. 20.00 Lakh (or as per the directions issued by GoK) immediately, failing which the Board will pay and the same will be recovered by the contractor.

26. The bidders have to compulsorily visit work site before quoting to have hands on information as per site condition. The letter issued by concerned Executive Engineer has to be enclosed as a proof of site visit.

27. **ENGINEER'S REQUIREMENTS**

27.1 Office

A separate Engineer's office for the sole use of the Engineer and his staff shall be provided by the Contractor for this contract at location identified by BWSSB. The Contractor shall provide, erect, furnish, clean and maintain the office. The proposed office building shall meet the following minimum carpet area requirements:

(a) Engineering Room -2 Nos., 10m x 8m each with attached toilet
(b) Engineering Room-1 No., 5m x 5m
(c) Computer Room with Air Conditioner - 1 No. 3m x 3m
(d) Toilets with wash basin -3 Nos. 1.5m x 2m each

The walls shall be of 230 thick brick masonry, plastered and with oil bound distemper on the inner face and snow cem on the outer face. AC sheet roofing with 6 mm thick hard board false ceiling at 3

meter from floor, painted with oil bound distemper shall be provided. The doors shall be of first quality wood and steel windows of approved quality shall be provided. The flooring for the office building shall be minimum 2.5 mm thick Vinyl flooring over PCC base. Before commencing the construction of the office, the Contractor shall submit to the Engineer for his approval a drawing of the proposed building with all architectural and finishing details fully shown. The location of the office shall be as directed by the Engineer.

The Engineer's office should be ready in all respects within 60 days of handing over the site. The Office shall be maintained through out the contract period and defect liability period there on with office boy, power, water and house keeping. Power and water supply shall be arranged by the Contractor either with the available resources or from independent sources (like DG sets, borewells, etc.) at his own cost.

The Contractor shall furnish the rooms as the Engineer directs and the equipment, furniture, furnishings and fittings to be supplied shall be of approved make and include the following at each site.

(a) 10 Nos. of 5' x 3' table with both side drawers (3 on each side)
(b) 2 No. of 3' x 2' table with single side three drawers
(c) 20 chairs (approved make) excluding chairs for Computer and Conference
(d) 3 Nos. of Steel cupboards (Storewel type)
(e) 2 Nos. - 4 Drawers Filing Cabinet
(f) Curtains to all windows
(m) Computer Table and Chair
(n) Brand new Laptop and a Personal computer with following features including UPS of 500 VA:

- Pre-loaded with licensed **I5 processor with quad core**
- ATX Cabinet
- 512 KB external cache
- 4 GB RAM
- 500 GB HDD
- COMBO DRIVE – R/ CD/R/W
- 48X speed CD-ROM on EIDE controller
- 17" SVGA LCD color monitor
- 8 USB 2 serial ports + 1 parallel port
- Internet key board

- Optical Mouse and Mouse pad

- Security and Management features

- HP Laser jet Printer (Suitable for A3 size paper) or equivalent

- Additional software – with licensed windows 10 OS, antivirus, antispyware Autocad latest version and firewall

- HP Business inkjet 2800

- Modem

- All the necessary consumables, including paper, CDs, printer cartridges etc

The fittings shall include:

(a) 2 Nos of 4' – 0" long tube lights in each room except in Conference room and toilet.
(b) 2 Nos. of normal pendant bulbs of 100 watts in all rooms
(c) 1 Nos. 48" ceiling fan in each room
(d) All rooms with 2 plug points each

These items are to be maintained in proper condition throughout the construction period and shall be handed over to Board as directed by the Engineer.

No separate payment shall be made for items covered above including Engineer's office with the exception of running cost of cellular phone for which a separate provisional sum is allotted.

27.2 Assistance to the Engineer

The Contractor shall provide all necessary assistance to the Engineer and his staff in carrying out their duties of checking, inspecting and measuring the Works. The Contractor shall provide chainmen, staff men, office attendants and labourers as may be needed from time to time by the Engineer at his own cost.

The Contractor shall provide for the Engineer and his staff, consultants and their staff and visitors such protective clothing, safety helmets and rubber boots of suitable sizes, hand lamps and the like as may be reasonably required by them. These articles shall remain the property of the Contractor. No separate payment shall be made on this account.

27.3 Instruments to be provided

The Contractor shall provide at his own cost for the exclusive use of the staff of the Engineer all survey equipments and measuring instruments of approved make and of every kind necessary for the execution of the Works, including

One 360 degrees circle optic theodolite, to read to one second, complete with carrying case and sliding leg tripod, all to the approval of the Engineer ;Two automatic surveyor's levels with horizontal 360 degrees circle, tripod with carrying case, all to the approval of the Engineer;

Two staffs, 4.5 m long, each in 3 sections and with attached bubbles, graduated in metres and tenth and hundredths of a meter, all to the approval of the Engineer ;

Two Surveyor's steel bands of which one shall be 100 m long and approximately 20 mm wide and one shall be at least 30 m long and approximately 12 mm wide, each fully divided, complete with tape thermometers and tension handles and wound on an open plastic cross, all to the approval of the Engineer ;

An adequate number of ranging rods, steel and linen tapes, string lines, pegs, lines, spirit levels, survey umbrellas, lights, batteries, stores and tools.

The instruments mentioned above shall be for exclusive use of the Engineer and shall remain in the custody of the Engineer till the Works are completed.

The Contractor shall be solely responsible for all such instruments and equipments and shall ensure that they are at all times in good repair and adjustment, and shall make good any loss or damage howsoever caused. No separate payment shall be made on this account.

On completion of the Works, the entire set of instruments provided by the Contractor shall be returned back to him.

27.4 Telephone

The Contractor shall arrange for a telephone line with internet facility at each site as directed by Engineer for his sole use. The Contractor shall pay for their installation charges.

27.5 Transport

The Contractor shall provide one new top end 4+1 seated AC Maruti Grand Vitara (Alpha Plus Intelligent) fully loaded to be kept available at all times for the sole use of the Engineer and his staff.

At the end of project (after completion of Defect Liability period) the contractor shall handover the vehicle in good condition to Employer.

The Contractor shall be solely responsible for the running and upkeep for the transport including taxes, insurance, licenses, fuel, oils, lubricants, repairs and maintenance and shall also provide a competent driver with the vehicle up to the end of Defect liability period. No separate payment shall be made for providing above.

28. The Successful tenderer should follow the rules and regulations issued by Safayi karmachari GOK

Sd/-

Chief Engineer

(Waste Water Management-W)

SECTION 6:
CONTRACT DATA

Items marked "N/A" do not apply in this Contract.

The following documents are also part of the Contract:

- The Schedule of Operating and Maintenance Manuals
- The Methodology and Program of Construction
- Site Investigation Reports
- The Schedule of Key and Critical Equipment to be deployed on the work as per agreed program of construction.

The Employer is :

Name: Bangalore Water Supply and Sewerage Board represented by **Chief Engineer (Waste Water Management-West)**

Address: Bangalore Water Supply & Sewerage Board
6th Floor, Cauvery Bhavan D-Block,
K.G. Road, Bangalore 560009

Name of authorized Representative: Executive Engineer (WWM-N-V.V)
Bangalore Water Supply & Sewerage Board
V V STP premises,
Bengaluru -560026

The name and identification number of the Contract is : **Work of Providing & Laying of 1200 & 1600 mm dia RCC NP-3 pipeline from SMV Layout near Hosakere Lake to Vidhyapeeta common chamber near Kengeri bridge**

The start date shall be the date of issue of notice to proceed with the work.

The Intended Completion Date for the whole of the Works is **24 Months**

Milestone Dates:

	Physical works to be completed	Period from the date of issue of notice to proceed with the work
Milestone 1	577 Rmt of sewerline to be complete in all respects as per the scope of work awarded in the contract.	0-8 months
Milestone 2	577 Rmt of sewerline to be complete in all respects as per the scope of work awarded in the contract.	8-16 months
Milestone 3	577 Rmt of sewerline to be complete in all respects as per the scope of work awarded in the contract.	16-24 months
Milestone 4	579 Rmt of sewerline to be complete in all respects as per the scope of work awarded in the contract including TT and MWSL works as per the requirements of Site Engineer.	24-30 months

The Site possession date is the day of issue of notice to proceed with the work

The Site location is defined in drawing.

The Defects Liability Period is 365 days.

Insurance requirements are as under:

Type of Cover		Minimum Cover for Insurance
(i)	Works , Plant and materials	The sum stated in the Agreement plus 20%
(ii)	Loss or damage to equipment	Full replacement cost
(iii)	Loss or damage to property of Third Party	Full replacement cost
(iv)	Personal injury or death insurance (a) for Third Party	Rs. 20.00 Lakh (Or as per the directions issued by GoK)
	(b) for Contractor's employees or labour	In accordance with the statutory requirements applicable to Karnataka

The liquidated damages for the whole of the works are Rs. ***0.1%*** per day of the contract value and that for the milestones as above. The maximum amount of liquidated damages for the whole of the works is ***ten*** percent of final contract price.

The date by which "as-built" drawings (in scale **1:200**) in 2 sets are required is within 30 days of issue of certificate of completion of Whole or Section of the Work as the case may be.

The amount to be withheld for failing to supply "as the date required is Rs.1,00,000-00

The following events shall also be fundamental breach of the contract :

1. The contractor has contravened Sub-clause 7.1 and Clause 9 of CC.

The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be ***30*** percent.

Sd/-

Chief Engineer (Waste Water Management-W)

Appendix - Price Escalation

A) Price Adjustment Formula for Works Contract:

R = Value of work as defined in Clause 40.1 of Conditions of Contract

(i) Adjustment for labour component:

Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

VL = [0.85*PL/100*(Li-Lo)/Lo, cutoff to 3 decimal]*R

VL is = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local labour;

Lo = The average consumer price index for industrial workers for Bangalore Centre for the Quarter preceding the date of opening of tenders as published by the Labour Bureau, Ministry of Labour, Government of India;

Li = The average consumer price index for industrial workers for Bangalore centre for the quarter under consideration as published by Labour Bureau, Ministry of Labour, Government of India

PL = Percentage of labour component of the work

(ii) Adjustment for Cement Component:

Price adjustment for increase or decrease in the cost of cement component procured by the contractor shall be paid in accordance with the following formula.

VC = [0.85*PC/100*(Ci-Co)/Co, cutoff to 3 decimal]*R

VC = Increase or decrease in the cost of the work during the quarter under consideration due to changes in the rates for cement;

Co = The all India average wholesale price index for cement (Ordinary Portland Cement) for the quarter preceding the date of opening of the tenders as published by the Office of Economic Advisor, Ministry of Commerce and Industry, Government of India , New Delhi;

Ci = The all India average wholesale price index for cement (Ordinary Portland Cement) for the quarter under consideration as published by the Office of Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

PC = Percentage of cement component of the work

Note: For the application of this clause index of Ordinary Portland Cement has been chosen to represent Cement Group. This may be changed depending on the major type of steel used depending on the nature of work.

(iii) Adjustment for Steel Component:

Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula.

VS = [0.85*PS/100*(Si-So)/So, cutoff to 3 decimal]*R

VS = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for steel;

So = The all India average wholesale price index for steel ((Mild Steel. Long Products)) for the quarter preceding the date of opening of Bids as published by the Office of Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

Si = The all India average wholesale price index for steel (Mild Steel Long Products) for the quarter under consideration as published by the Office of Economic Advisor, Ministry of Commerce and Industry, New Delhi

PS = Percentage of steel component of the work

Note: For the application of this clause, index of (Mild Steel Long Products) has been chosen to represent steel group. This may be changed depending on the major type of steel used depending on the nature of work.

(iv) Adjustment of Fuel and lubricant component

Price adjustment for increase or decrease in cost of Fuel and Lubricants shall be paid in accordance with the following formula:

VF = [0.85*PF/100*(Fi-Fo)/Fo, cutoff to 3 decimal]*R

VF = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for Fuel and Lubricants.

Fo = The official retail price of High Speed Diesel (HSD) at the IOC/HPCL/BPL or other consumer pump at Bangalore on the day 30 days prior to the date of opening of Bids.

Fi = The official retail price of HSD at the IOC/HPCL/BPL or other consumer pump at Bangalore for the 15th day of the middle calendar month of the quarter under consideration.

PF = Percentage of Fuel and Lubricant component of the work.

(v) Adjustment for Bitumen

Price adjustment for increase or decrease in the cost of Bitumen procured by the contractor shall be paid in accordance with the following formula:

VB = [0.85*PB/100*(Bi-Bo)/Bo, cutoff to 3 decimal]*R

VB = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for Bitumen

Bo = The all India average wholesale price index for Bitumen for the quarter preceding the date of opening of bids, as published by the Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

Bi = The all India average wholesale price index for Bitumen for the quarter under consideration as published by the Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

PB = Percentage of Bitumen component of the work.

vi) Adjustment for Other materials

Price adjustment for increase or decrease in the cost of other materials other than cement, steel, bitumen and Fuel and Lubricants, procured by the contractor shall be paid in accordance with the following formula:

VM = [0.85*PM/100*(Mi-Mo)/Mo, cutoff to 3 decimal]*R

VM = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for local materials other than cement, steel, bitumen and Fuel and Lubricants.
Mo = The all India average wholesale price index for all commodities for the quarter preceding the date of opening of bids, as published by the Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi
Mi= The all India average wholesale price index for all commodities for the quarter under consideration as published by the Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India, New Delhi

PM = Percentage of other material component (Other than cement, steel, bitumen and Fuel and Lubricants) of the work.

Note: Quarter preceding = Three consecutive calendar months preceeding the calendar month of opening the Tender.

The following percentages will govern the price adjustment for the entire works contract:

For Works Contract Sl. No	Description of Co-efficient	Range of Weightings %	Weightings %: Bidders to Specify below
1	Labour (PL)	15 - 20	
2	Cement (PC)	25 - 30	
3	Steel (PS) Bars & Rods	15 - 20	
4	Fuel and Lubricants (PF)	5 - 10	
5	Bitumen (PB)	10 - 20	
6	Other Materials (PM)	15	15
Total		**100**	**100**

Note : If weightage % is not specified by the bidder in the table before uploading the tender document. It is implied that the bidder has considered the price adjustment factor in his quoted price and thus Price adjustment will not be considered during works contract.

To the extent that full compensation for any rise or fall in costs to the Contractor during Works period is not covered by the provisions of this or any other clause in the Contract, the Works Contract Price shall be determined to include amounts to cover the contingency of such other rise or fall in costs

Sd/-

Chief Engineer (Waste Water Management-W)

SECTION 7:

TECHNICAL SPECIFICATIONS

I) General:

1.1 Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be procured, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be acceptable subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure equal or higher quality, the Contractor shall comply with the standards specified in the documents.

1.2. Sign Board

The Contractor shall provide a sign board at the site of the Works of approved size and design which provides (i) the name of the Project (ii) the names and addresses of the Employer, the Contractor and the Consultant; (iii) the name and short description of the Project, (iv) the amount of the Contract Price ; and (v) the starting and completion dates.

1.3. Samples and Tests

The Contractor shall be responsible to develop a quality control program and to provide all necessary materials, apparatus, instruments, equipment, facilities and qualified staff for sampling, testing and quality control of the materials and the works under the Contract. Without limiting the generality of the foregoing, the Contractor shall either (i) establish a testing laboratory at the site of Works which is adequately equipped and staffed to carry out all sampling and testing in accordance with the requirement set out in the General Specifications and/or these Special Specifications and provide all field equipment and apparatus as necessary to conduct all specified in-situ tests and/or any Tests on Completion, provided the correctness of the equipments are ensured or (ii) arrange for routine sampling, testing and reporting, as required, through a certified independent testing laboratory acceptable to the Engineer. All costs of such sampling, testing and reporting of test results will be borne by the Contractor.The Contractor shall furnish certified copies of all test reports to the Engineer within 3 days of completion of the specified tests.

The Contractor shall make necessary arrangements for conducting the quality control programme during execution of the Works, including details of

his testing laboratory, equipment, staff and general procedures. If following submission, or at any time during the progress of Works, it appears to the Engineer that the Contractor's quality control programme is not adequate to ensure the satisfactory quality control.

1.4. Protection of Utilities

The Contractor is required to carefully examine the location of the Works and their alignments and to make special enquiries with all authorities concerning all utility lines such as water, sewers, gas pipe, telephone (underground and/or overhead) lines, electric cable (underground and/or overhead) lines, etc.; and to determine and verify to his own satisfaction the character, sizes, position and lengths of such utilities from authentic records. The Contractor shall be wholly responsible for the protection and/or facilitating relocation of such utilities as may be required, and shall not make any claim for extra work or extra time that may be required to protect or facilitate relocating such utilities. If any major shifting or realignment of water, sewers, gas pipes, electric and telephone lines is necessary due to their interference with the proposed Works, the same may be done by the Employer. The cost of such relocation will be borne by the Employer. In case the alignment of the pipeline crosses high tension electrical transmission lines belonging to the Karnataka Power Transmission Corporation Ltd. (KPTCL) or other authorities, the Contractor shall take all precautions necessary to see that the work is carried out with care and safety, without disturbing such transmission lines. The Contractor will be responsible to carry out all construction activities in such reaches in consultation with the owners of such facilities. However, satisfactory completion of the entire work will be the responsibility of the Contractor.

2.0 Detailed Specifications:

The manufacture, supply, laying, jointing testing and commissioning of pipes used for sewage disposal shall generally conform to specifications.

2.1 Manufacture, Supplying, Laying, Jointing and Testing of pipes

Manufacturing, supplying, laying, jointing, testing and commissioning of pipes used for Sewerage shall generally conform to Standard specification. The alignment of sewer lines given in the drawing is only indicative and the exact alignment will be as per construction drawings / as directed by the Engineer or his representative. The alignment of sewers runs along side or centre of or across the carriageway and in some stretches it runs along the storm water drains. In these stretches the top of the Machine holes shall be raised above the high flood level of the drains as per the details given in the construction drawings. Pipes shall be laid underground with a minimum earth cover of 1m above the crown of the pipe, unless otherwise specified. All pipes, fittings and material shall be inspected and approved by the Engineer before being laid. Any pipes, fittings or material placed before they are inspected and approved shall be removed and replaced with approved

material. Before laying the pipe, necessary bedding shall be provided to the pipes, wherever specified.

In general, unless and otherwise specified, the sewer lines shall be of RCC NP-3. The branch sewer crossing the storm water drains and roads (limited to span of crossing only) in the project town, as indicated in the drawing, shall be of RCC pipe.

Contractor has to conduct hydraulic test of sewer lines from Machine hole to Machine hole throughout the length upto disposal point. The hydraulic test are from Machine hole or from sewer to the end of the pipeline laid up to property or the length as directed by the Engineer.

2.1.1 Reinforced Cement Concrete Pipes

Manufacture of pipe

The RCC pipes to be used for lateral, branch and trunk / outfall sewers shall be of class NP-3 & NP-4, Spigot and Socket (S&S) type, with rubber gasket jointing, manufactured in Conformity with IS 458. All the Pipes shall be manufactured using **Sulphate resistant cement** and Marked with ISI. The ends of the pipes shall conform to Clause 5.3 of IS 458 as applicable for S&S joints. The rubber ring shall conform to IS 5382 and IS 12820 as applicable for sewer lines and shall be of type 'IA'. The diameters of pipes shall be as required for sewers as per designs and drawings.

The method of manufacture shall be such that the form and dimensions of the finished pipes are accurate within the limits specified in relevant IS: 458. Pipes manufactured in compliance with IS: 458 shall be either water cured or steam cured in accordance with the relevant requirements of IS: 458.

The Internal diameter, wall thickness, length of barrel, reinforcement (longitudinal and spiral), type of ends and minimum clear cover to reinforcement, strength test requirements, tolerances on - overall length, internal diameter or dimensions of sockets / spigots of pipes shall be as per the relevant clauses / tables of IS: 458. Minimum clear cover to reinforcement shall be 15 mm. The tolerances regarding overall length, internal diameter of pipes or socket and barrel wall thickness shall be as per relevant clauses of IS: 458. Each pipe unit can be in lengths of 2 m to 4 m based on availability, ease in handling, transportation and laying.

The workmanship and finish for the pipe will conform to the relevant standard specification at section-9. Cleaning of pipes shall conform to relevant Standard specification.

Jointing of pipes with Spigot and socket joints shall conform to the relevant Sub Clauses

2.1.2 Testing of pipes during manufacture

During manufacture, tests on concrete shall be carried out as per IS: 456.

The specimen of pipes for the following tests shall be selected in accordance with Sub-Clause 9.1 of IS: 458 and tested in accordance with the methods described in IS: 3597:

1. Hydrostatic testing
2. Three edge bearing test
3. Absorption test

2.1.3 Laying of the pipe

Laying of concrete pipes shall conform to the Code of practice of IS: 783. Pipes shall be laid underground with a minimum earth cover of 1m. Pipes shall be generally laid in sections of 300 m each. Laying of pipes shall be as per Clause stated above for Procurement of Project Works. All pipes, fittings and material shall be tested and approved by the Engineer before being laid. Any pipes, fittings or material placed before they are tested and approved shall be removed and replaced with tested and approved material. Before laying the pipe, necessary bedding shall be provided wherever required as per Sub-Clauses 6.4.1, 6.4.2, 6.4.3 and 6.4.4 of this section.

2.1.4 Jointing of pipes

The pipe joints shall be flexible joints, jointed by rubber ring of type 'IA', as per IS 783-1985. The sections of the pipe shall be jointed in such a manner that there shall be as little unevenness as possible along the inside of pipe. Care should be taken while jointing to provide the correct gap between the end of spigot and back of the socket to ensure flexibility at each joint and correct location. The joints shall be finished as directed by the Engineer. The quality of rubber ring, tolerances, etc., shall be in conformity with IS 5382-1985.

2.1.5 Measurement of pipes

The length of the sewer pipes shall be measured between the inner surfaces of consecutive Machine holes at the invert level of the pipes along the central line of pipeline to the nearest centimeter.

3.0 Machine holes

Machine holes shall be constructed at places as shown in the drawings or as directed by Engineer for which payment shall be made at quoted rates. Any Machine holes required to be provided extra, at the locations shown by the Engineer, shall be provided by the Contractor, for which payment shall be made extra at the quoted rates. The Contractor is responsible for giving suitable connections at the junctions of sewer lines with the Machine holes. The Machine holes have been divided into different categories based on depth. The depth of Machine hole shall be measured from the top of cover to the invert level of the deepest outgoing sewer from the Machine hole.

3.1 RCC Machine holes

The construction of **RCC Machine hole chambers (Cast-In-Situ or Pre-Cast)** includes,

Earth work Excavation in all classification of soils including hard rock by blasting / controlled blasting/ chistelling as directed including cutting road surface of all types and depositing of the excavated stuff on Bank upto a lead of 30mts with danger lighting and use of sight rails and boning rods wherever necessary, shoring and Strutting wherever required including excavation in watery situation or foul conditions where the over night recuperation does exceed 1m.

Providing and Construction of RCC Machine hole chambers 1:1.5:3 of approved type Cast -in situ/Pre-cast RCC Machine hole chambers, constructed using form vibrators of standard type, with barricading, danger lighting and use of sight rails and boning rods wherever necessary, shoring and strutting wherever required using Sulphate Resistant cement of 1:1.5 :3 proportion RCC, with 20mm and down graded jelly, well graded sand and steel approved quality, 200mm thick top concrete slab, having wall thickness and raft thickness as in approved drawings and with an offset in raft round the chamber as in approved drawing, benching concrete with 1:6 slope towards the central drain finished smooth, including fixing and grouting of pipes, including supply conveying to work spot, and fixing SFRC Machine hole cover and frame (Heavy Duty) confirming to IS 1726 with latest amendments , on a bed of CC1:2:4 supplying and fixing of minimum 3mm thick encapsulated plastic foot steps (as per IS : 10910) on 12mm dia. Grade FE 500 steel bar (as per IS : 1786) staggered at 300mm apart as detailed in technical specifications, including sand bedding where ever required, disposal of surplus earth, watering, curing, engraving Machine hole number with flow direction on the inner cylindrical surface etc., complete including cost of reinforcement steel and fabrication charges and also cost and conveyance of all materials, labour / DI R/C with all leads and lifts for various diameter and depths noted below as per specification, drawing and as directed by Engineer inclusive of Earth work excavation in type of soil.,

Supply and fixing Machine hole frame and cover (SFRC of heavy duty cover as directed) in 1:2:4 CC, watering, curing, barricading, pouring tar over MH frame and cover, cost of tar, dewatering, engraving Machine hole number on the inner surfaces etc., as per drawing with all lead and lifts

Refilling in trench with selected available earth obtained from chamber excavation including watering and consolidation in layers 150mm thick and disposing of the surplus earth as directed for various diameters and depths.

Machine holes shall be constructed at places as shown in the drawings or as directed by Engineer for which payment shall be made at quoted rates. Any Machine holes required to be provided extra, at the locations shown by the Engineer, shall be provided by the Contractor, for which payment shall be made extra at the quoted rates. The Contractor is responsible for giving suitable connections at the junctions of sewer lines with the Machine holes.

4.0 TESTING

WATER FOR WORKS

The contractor should make his own arrangements for procurement and conveyance of water for construction, testing and other purposes in connection with the works.

5.0 Laying of pipe

Pipes shall be laid underground with a minimum earth cover of 1M. All pipes, fittings and materials shall be tested and approved by the Engineer before being laid. Any pipes, fittings or material placed before they are tested and approved shall be removed and replaced with tested and approved material.

6.0 Other Specials and Instruments

The Contractor is responsible to provide sufficient number of specials, as required for completing the work satisfactorily. The exact number of specials specified in Bill of Quantities, may increase or decrease depending on the requirement.

7.0 Commissioning

After satisfactory testing of the entire length of main, lining and coating of pipes, connections to the inlet and outlets, and successful construction and testing of the Master Balancing Reservoirs, the works shall be commissioned for operation.

II) EARTH WORK:

1. GENERAL:

The earth work excavation for laying of pipe shall be carried out. The Contractor shall make all excavations required for laying and jointing of the pipeline and construction of pertinent structures as required in the project. Except where otherwise required by the project or instructed by the Engineer, all excavation shall be in open cut to the specified widths and depths. The Contractor is advised to satisfy himself with regard to the likely conditions that may be met with during the execution of the Works, with regard to the underground obstructions or conditions, necessary dewatering requirements etc. Before commencing the earth work, the Contractor shall carry out detailed survey of the proposed alignment, prepare construction drawings showing the longitudinal section of the ground profile, locations of valves and other appurtenances and submit to the Employer for approval.

2. CLASSIFICATION OF EXCAVATION

All materials involved in excavation shall be classified in three categories as follows:

2.1 Ordinary soil

This includes excavation in all types of soil including soil containing gravels, murums, loose boulders, viz., ordinary gravely soil, hard gravely soil, wet soil, stiff slushy soil, chettu soil and calcareous strata, but exclusive of disintegrated rock, soft rock/shale;

2.2 Soil Containing Disintegrated Rock, Soft Rock and Soft Shale

This category includes excavation in soil containing disintegrated rock, soft rock or soft shale which can be cut by shovel and no hand or mechanical chiseling is required.

2.3 Medium Hard Rock

This category includes excavation in lime stone, sand stone, hard shale and schist fissured rock, without resorting to blasting.

2.4 Hard Rock

This category includes excavation in hard rock requiring hand or mechanical chiseling or blasting. In case of difference in opinion between the classification of rock requiring blasting and that requiring chiseling, wedging, the site of work shall be inspected by the engineer and the decision of the Engineer shall be final and binding on the Contractor.

3 Limits of excavation

The trench for laying RCC pipes of all sizes shall have minimum width as per standards stipulated or as directed by the Engineer-in-charge A minimum earth cover of 1.0 m shall be maintained above the pipe top, unless otherwise specified or shown in the alignment drawings. Any extra excavation required for providing suitable bedding for the pipeline or for maintaining the grade of the pipeline, shall be paid extra at actual, and based on the quoted rates.

The Contractor shall be responsible to ensure that the widths and depths of the trenches do not exceed the limits shown in the construction drawings. Should the excavation occur beyond the dimensions specified therein, because of the negligence of the Contractor, the Contractor shall fill the excess space with granular material or concrete as directed by the Engineer. Nothing extra shall be paid to the Contractor on account of this.

4 Slips and slides

The Contractor is responsible for proper protection of excavations made by him from any slips and slides. All slides and caving shall be handled, removed or corrected by the Contractor without any extra compensation at whatever time and under whatever circumstances they may occur. The excavations shall be made good and brought to necessary depth, width and levels without any extra cost.

5. Stacking of excavated material

The excavated material shall be stacked at least 600 mm away from the sides of the trench.

6. Safety measures

The Contractor shall provide adequate safety measures during excavation. They shall include:

1. Barricading all sides of the open trenches.
2. Red danger lights which can be easily visible from dusk to dawn placed at an interval of 20 m and at all the road crossings.
3. Traffic signals and display boards giving direction for diversion of traffic at the appropriate places as may be directed by the Engineer.
4. Adequate safe wooden plank / board or steel plate over the trenches at every 15 meters interval to facilitate crossing by the public residing on either side of the trench.
5. Round the clock watch and ward maintaining all safety regulations at the site of work and protecting the site from unauthorised intrusions.

7. Progress of Excavation of pipe trenches

The Contractor shall adjust excavation of trenches in such lengths that the pipes can be laid in such exposed portion of the trench within 2 days.

8. Shoring and Bracing

The Contractor shall supply, fix and maintain necessary sheathing, shoring and bracing etc., in steel or wood, as may be required to support the sides of the excavation, to protect workmen in the trench and to prevent any trench movement which might any way injure or delay the work, change the required width of the trench, make unsafe condition for adjacent pavements, utilities, buildings or other structures above or below ground.

Sheathing, shoring and bracing shall be withdrawn and removed as the backfilling is being done, except when the Engineer may agree that such sheathing, shoring and bracing be left in place, at the Contractor’s request. In any case, the Contractor shall cut off any such sheathing at least 600 mm below the surface and shall remove the cut off material from the trench.

All sheathing, shoring and bracing which are left in place under the foregoing provisions shall be removed in a manner so as to not endanger the completed work or other structures, utilities or property, whether public or private.

9. EXCAVATION

9.1 Excavation in Rock

Excavation in rock shall be carried out to a depth, 150 mm more than the bottom level of pipe and to a width equal to the diameter of the pipe plus minimum working space on either side as given in drawing. Unless otherwise directed by the Engineer, rock excavation shall be progressed at least by 50 m in advance of the pipe length proposed to be laid.

9.2 Excavation for Inlets, Junction Chambers and Other Appurtenant Structures

The Contractor shall excavate as required for all structures with foundations to firm, undisturbed earth up to the level of the under side of the structure. If the excavation is in rock, the Contractor shall excavate all rock at least to the minimum limits shown on the standard details for trenches and to the grade of the bottom of inlets, junction chambers or other structures as required. Where the bottom of the structure is in rock, it should be ensured that no rock shall project above the lower surface of the concrete in such a manner so as to reduce the required thickness of concrete placed simultaneously as an integral part of the foundation and to the outside of structure foundation where structure is to be built. The Contractor shall excavate the trench / pit to provide necessary working space on all sides and for accommodating any sheathing, shoring or bracing etc.

10. Contractor's Responsibility

The Contractor shall be responsible for the adequate pumping, drainage and bailing out water from the excavated trench. In case of failure to make such provisions or any other provisions which may result in unsuitable sub-grade conditions, the Contractor shall replace and repair the sub-grade as directed to the satisfaction of the Engineer, at his own cost and responsibility.

Should the Contractor select to use a gravel sub-grade to facilitate flow of water to pumps or other points of disposal, such gravel sub-grade shall not be measured or paid for as an extra item.

11. Works Included in Excavation

The following works as per specifications are also included in excavation and the term 'Excavation' shall construe to mean all such items of work. The quoted rates should include the same:

1. Provision of side space or additional space in the trench/pit for working and/or accommodating sheathing, shoring, bracing, etc.
2. Supply, installation and removal after the work, all sheathing, shoring and bracing required to protect the excavation where required or where such work is recommended by the Engineer.
3. Protection of excavations.
4. Providing adequate safety measures.
5. Additional work in connection with overhead wires and poles.
6. Excavation for Socket hallows.
7. Change of trench location in accordance with Clause 15.7.7 of Chapter 10.
8. Supplying and fixing of sight rails and boning rods in the trench to facilitate measurement of work.

12. Measurement and Payment for Excavation

12.1 FOR EXCAVATION

The measurement for excavation shall be considering the allowable widths, depths with allowed side slopes (if any) for different classes of soils as per

approved classification. The measurement for excavation shall be based on “neat line” dimensions as specified in the drawing or Specifications, for different types of soils and depth of excavation. The total volume of excavation shall be computed as a square bottomed trench of width equal to the outer diameter of the pipe, with minimum working space as given in the drawing, added to it, length up to the length of the trench being measured. The depth of trench being average depth taken at 30 m intervals, between the level of bottom of trench and the original surface of the ground. The length of the trench shall be measured as per the actual length of pipes and fittings / specials laid at work site. However depth shall be measured at closure intervals at vulnerable places. The volume of excavation for structures like valve chambers, thrust blocks and anchor blocks etc., shall be computed and measured for payment as per the bottom area of the particular structure on outer periphery multiplied by the average depth between the level of the finished bottom of the structure and the original surface of the ground. The quantity shall be measured in cubic meters correct to two decimal places. The method of measurement for excavation in different classes of soils shall be as follows:

12.2 IN ORDINARY SOIL AND SOIL MIXED WITH DISINTEGRATED ROCK AND SOFT ROCK / SHALE

In this category of soils, the excavation quantity shall be computed as specified above.

12.3 IN HARD ROCK

In case of hard rock requiring chipping or chiseling, measurements shall be taken prior to and after chiseling and the volume of rock excavation shall be measured based on this difference. In case of excavation in hard rock by blasting, the quantity of rock excavated shall be stacked along the side of the trench, which will be cross checked with the trench dimensions. The excavation in rock shall be paid on stack measurements with a deduction of 40% in volume for voids. However, the payment for rock excavation by blasting shall be limited so as not to exceed the volume computed based on the trench dimensions as per specifications.

12.4 FOR EXCAVATION IN COMBINATION OF ORDINARY SOIL, DISINTEGRATED ROCK, SOFT ROCK/SHALE AND HARD ROCK/SCHIST

Wherever the excavation is undertaken in combination of ordinary soil, disintegrated rock, soft rock /shale and hard rock, the hard rock part shall be measured and paid, the soil part shall be measured and paid for the total measurable excavated quantity deducting the quantity measured for the hard rock. The total computed volume of excavation shall be equal to the sum of the computed volumes for each category of excavation undertaken.

III) BACK FILLING

1. Backfilling of Trenches and around foundations of structures

1. General

The Contractor shall use selected surplus spoils from excavated materials for backfilling. All fill material shall be subject to Engineer's approval. The excavated materials suitable for backfilling shall be stored not closer than 600 mm from the edge of the trench and shall not obstruct any public utilities or interfere with travel by local inhabitants or general public. Handling and storage of excavated materials must meet with the regulations of the Local Government Authorities. The detailed specifications for backfilling shall be as per Clause 8 of IS: 3114-1994 and Clause 4.11 of IS 12288-1987.

2. Method of Backfilling

Trenches and excavated pits for structures shall be backfilled to original ground level or to such other levels, as the Engineer may direct. All backfilling shall be carried out in orderly manner expeditiously and consistent with good workmanship.

Backfill material put into the trenches/pits for backfilling, shall unless otherwise specified be compacted and built up as to minimise future settlement as much as is reasonably possible. For this, care shall be exercised in selecting backfill material free from large hard clay lumps, especially in cramped areas directly adjoining the walls of structures.

Backfilling in trenches shall be done as pipe laying progresses, with the permission of the Engineer, after the pipe or conduit is properly bedded, jointed and inspected and all measurements for the location of Y-Junctions, tees, etc., are properly recorded by the Engineer and sufficient time is allowed for the joint materials or cement concrete or mortar to set. However the joints shall be left open for inspection during testing, which shall be backfilled after successful completion of testing, after obtaining permission from the Engineer. Backfilling around and over the pipe, conduit, or structure shall be taken up uniformly on all sides and in the sequence and manner specified hereinafter, with care to avoid the displacement or damage to the pipe, conduit or structure. For the purpose of backfilling, the depth of trench shall be divided into the following three zones measured from bottom to top of trench, as follows:

i. Zone A : From bottom of trench to the centre line of pipe,

ii. Zone B : From the level of centre line of pipe to a level of 300 mm above the top of pipe,

iii. Zone C :From a level of 300 mm above the top of pipe to the top of trench.

Backfilling in the trenches and around structures shall be carried out in horizontal layers of uniform thickness of not more than 150 mm when measured loose. As may be necessary to attain maximum compaction, the backfill material shall be moistened by sprinkling with water. After placing each layer of backfill material, the layer shall be thoroughly and uniformly compacted by means of mechanical or hand tampers. The compacting

equipment and the manner of its use shall be subject to the approval of the Engineer.

After the backfill material is placed in Zone A and Zone B as specified above, the remaining portion i.e., Zone C of the trench may be machine backfilled. Even in this case the backfill material shall be placed in uniform horizontal layers of not more than 150 mm thickness. Small pebbles of size less than 50 mm, if any, shall be so distributed throughout the mass, that all interstices are solidly filled with fine material. The backfill material shall be tamped with mechanical tamping equipment, after moistening the backfill by sprinkling with water to obtain maximum compaction (min 95% proctor density).

Machine backfill shall be so conducted that the material deposited in the trench shall not fall directly on top of the pipe from such a height as might result in damage to the pipe joints or alignment.

If the trench is subjected to conditions which might cause flotation of the pipe before sufficient backfill has been placed, the Contractor shall take the necessary precautions to prevent floatation of the pipe, conduit or structure.

Before final acceptance of the work, additional tamped earth shall be added to restore the settled trench surface to the required level of the adjacent earth surface or to the base of crushed rock wearing surface or to the finished earth base.

If from the excavated soil, enough backfill material is not available, imported, selected and approved backfill material from the borrow pits is required to be placed for backfill, on approval of the Engineer backfilling of trenches where the excavation is in the rock shall be with the surplus soft soil, with all lead and lift.

3. DISPOSAL OF SURPLUS EXCAVATED MATERIAL

The excavated material which is in surplus to the requirements after backfilling shall be removed and spread at places shown by the Engineer, with all lead and lift from the site of work, for which no extra payment shall be made. No surplus or excess material shall be disposed in a stream / channel or in any place where the pre-construction surface drainage may have to be provided, without written permission of the Engineer.

IV) ANCILLARY STRUCTURES

1.1 Structures for Crossing Canal/ Nallahs and Other Miscellaneous Structures

Structures for crossing the pipeline over canals/Nallahs and other miscellaneous structures not listed in these specifications but may be required to be built shall be as per construction drawings and as described in Bill of quantities. The materials of construction of workmanship for those structures shall conform to the relevant Standard Specifications for Procurement of Project Works as given in Chapter 10. The measurement of quantities involved in these structures for payment shall be done as per dimensions of the respective drawings.

1.2 PIPE LINE CONNECTIONS

The Contractor is responsible for giving suitable connections at the inlet and outlet ends of the pipelines, etc.

V) Grade of concrete

1. Ordinary Concrete

In case of ordinary concrete, mix is not required to be designed by preliminary tests and proportions of cement, fine aggregates and coarse aggregates are specified by volume. The ordinary concrete shall be in four grades designated as M 7.5, M 10, M 15 and M 20. It can also be specified by volumetric mix as given in Table-4 below. For cement which normally comes in bags and is used by weight, volume shall be worked out taking 50 kg of cement as 0.035 cubic meters in volume. Shaking, ramming or hammering shall not be done. Proportioning of sand shall be as per its dry volume and in case it is damp, allowance for 'bulkage' shall be made as per IS: 2386 (Part III).

Ingredients required for ordinary concrete containing one bag of cement for different proportions of mix shall be as given in Table-4 below.

Table-4

Ingredients Required for Ordinary Concrete

Grade of Concrete *	Nominal Mix by volume Cement: Fine Aggregate: Coarse Aggregate**	Total quantity of dry in kg (max) by mass per 50 kg of cement (to be taken as the individual masses of fine and coarse aggregates)	Quantity of water in liters (max) per 50 kg of cement***
M 7.5	1:4:8	625	45
M 10	1:3:6	480	34
M 15	1:2:4	350	32
M 20	1:1.5:3	250	30

* In the designation of a concrete mix, letter 'M' refers to the mix and the number refers to the specified 28 days' works compressive strength of that mix on 150 mm cubes, expressed in N/ sq. mm.

** The proportions of the aggregate shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger.

*** The amount of water should be kept minimum required for proper workability. The quantity given in the column is not to be exceeded.

1.1 Strength Requirement of Concrete

Where Ordinary Portland Cement conforming to IS.269 or Portland Blast Furnace Cement conforming to IS:455 is used, the compressive strength requirements for various grades of concrete controlled as well

as ordinary shall be as given in Table-5. Where rapid hardening Portland cement is used, the 28 days compressive strength requirements specified in Table-5 shall be met at 7 days.

For controlled concrete, the mix shall be so designed as to attain in preliminary tests a strength at least 33 per cent higher than that required on work tests for concrete up to and including M 25, and 25 per cent higher for higher grades. Preliminary tests need not be made in case of 'ordinary concrete'.

Table-5 : Strength Requirements

Grade of Concrete	**Compressive test Strength on 150 mm cubes after testing in accordance with IS: 516 (N/sq.mm)**	
	Minimum at 7 days	**Minimum at 28 days**
M 10	7	10
M 15	10	15
M 20	13.5	20
M 25	17	25

In all cases, the 28 days compressive strength specified in Table-5 shall alone be the criterion for acceptance or rejection of the concrete.

Where the strength of a concrete mix, as indicated by tests, lies in between the strength for any two grades specified in Table-5, such concrete shall be classified for all purposes as a concrete belonging to the lower of the two grades between which its strength lies.

VI) TESTING AND COMMISIONING

1. Testing at site

All sewers and appurtenances shall be tested before commissioning and trial run as per the specifications this section. After laying and jointing of sewer pipes and before backfilling the trenches, the complete length of the sewer is to be checked for water tightness and the sole responsibility of arranging the necessary equipments and apparatus lies with the operator at his own cost. Any damage during testing shall be rectified by him free of cost. Water for testing shall be arranged by the operator at his own cost.

1.1. Water Test For Sewers

After Laying and jointing of sewer pipes and before back filling the trenches, the complete length of the sewer is to be checked for water tightness, Owner may exempt water test for lateral sewers, where house service connections are to be connected immediately.

The procedure for testing is as detailed as below,

1. Each section of sewer shall be tested for water tightness from Machine hole to Machine hole to prevent change in alignment and prevent disturbance after the pipe have been laid, it is desirable to back fill the pipes upto the top keeping at least 90cm length of the pipe open at the joints in case of longer length pipes.
2. In case of concrete and stone ware pipes with cement moratar joints, pipes shall be tested three days after cement mortar joints have been made. It is necessary that the pipelines are filled with water for about a week before commencing the application of pressure to allow for the absorption by pipe wall.
3. The sewers are tested by plugging the upper end with a provision for an air outlet pipe with stop cock. The water is filled through a funnel connected at the lower end provided with a plug. After the air has been expelled through the air outlet, the stop cock is closed and the water level in the funnel is closed to 2.50m above the invert at the upper end. Water level In the funnel is noted after 30min and quantity of water required to restore the original water level in the funnel is determined. The pipeline under pressure is then inspected while the funnel is still in position . there shall not be any leaks in the pipe or joints (small sweating on the pipe surface is permitted). Any sewer or part there of that does not meet the test shall be emptied and repaired or re-laid as required and tested again.
4. The leakage or quantity of water to be supplied to maintain the test pressure during the period of 10min shall not exceed 0.2 lit/mm dia. Of pipe per kilometer length per day.
5. Ex filtration test for detection of leakage shall be carried out at a time when the ground water table is low.
6. For concrete , RCC pipes of more than 600mm dia the quantity of water inflow can be increased by 10% for each additional 100mm of pipe dia.
7. After Complete on of the test all temporary seals shall be removed, the test water shall be drained out/pumped out and the line cleaned properly.

1.2. Test for straightness and obstruction

As soon as stretch of sewer is laid and tested, before commissioning the cleanliness of the pipeline is to be checked by the following tests as applicable and as decided by the engineer.

1.3. Torch and Mirror test

In this method of testing , a torch will be held in one end of the pipeline inside a Machine hole and its image through the pipeline will be reflected and seen on a mirror held at the opposite end of the pipeline, inside the next Machine hole. Any obstruction/debris/ major mis-allignment will not give a clear image in which case the pipeline will again be cleaned/ rectified and tests re done.

1.4 Ring Test

In this method testing of two steel/wooden rings of suitable thickness and design shall be fixed facing each other at a distance pf 2feet or more. The blocks of rings shall be inserted from o end of the pipeline, inside Machine hole and pulled by rope fixed to the block from the other end of the pipeline, inside the next Machine hole. The rings shall be dia 75mm less than the inside diameter of the pipe under testing. The rope used for pulling the ring block may be inserted in the pipeline by suitable means. Any construction/debris/major misalignment will prevent the ring to pass through the pipeline in which case the pipeline will again be cleaned/rectified and the test re done and no extra payment will be made. Alternately upon the approval of the Engineer the sewer may be tested by inserting at the high end of the sewer a smooth ball of dia 13mm less than the pipe bore, in the absence of obstruction such as yarn or mortor projecting through the joints, the ball should roll down the invert of the pipe and emerge at the lower end. . Any construction/debris/major misalignment will prevent the ring to pass through the pipeline in which case the pipeline will again be cleaned/rectified and the test re done and no extra payment will be made.

1.5 Water Test for Machine holes

The entire height of Brick and RCC Machine hole shall be tested for water tightness by closing the both incoming and outgoing ends of the sewer and filling the Machine hole with water. A drop in water level not more than 50mm per 24 hours shall be permitted . in case of high subsoil water it should be ensured that there is no leakage of ground water into the Machine hole by observing the Machine hole for 24 hours after emptying it.

1.6 Test Records

Complete test records shall be maintained for all tests carried out for both sewer both during construction and after being service. The tests carried out as in specifications, approved QAP shall be documented in the formats as approved by the Engineer and shall be carried out in the presence of the Engineer or his representative and shall be certified by the engineer or his representative and the operator. All completed test record/documents shall be submitted to the Engineer before submission of bills.

1.7 Commissioning

After satisfactory completion of works and testing of the sewer lines and appurtenances as per specifications in above clauses, the system shall be commissioned for trail run and operation.

VII) **MWSL METHOD:**

1.0 Intent

The intent of the contractis to carry out structural rehabilitation using structural Machine Wound Spiral Lining (MWSL)method of the sewers stretches under reference to enhance the life and structural capacity of the sewers under the contract.

1.1 General Requirements

(a) The MWSL process shall utilize one-part extruded polyvinyl chloride (PVC) or High Density Polyethylene profile strip to be spirally wound by machine into an existing sewer (host pipe). The extruded profile strip shall be mechanically locked or HDPE welded as it is spirally wound to form a liner inside the host pipe by use of the MWSL winding machine. The installation system shall provide precise control of the internal dimensions of the newly formed PVC or HDPE conduit that's hallen sure the specified annular space is maintained through out there-lined length.

(b) No grouting is required to fill the annular space between the outside of the liner and the inside of the host pipe when the liner pipe is expanded until it presses against the interior surface of the existing pipe. However, if the liner pipe is inserted as a fixed diameter into the existing pipeline and is not expanded, the annular space between the liner and existing pipeline shall be filled with a cementitious grout.

(c) The spiral wound PVC or HDPE profile process shall create are habilitated sewer with improved chemical resistance characteristics, improved flow coefficients, and structural enhancement for the host pipe.

(d) The reinforcing steel strip can be pre-inserted into the profile strip or formed into its profiled shape onsite, immediately before being mechanically interlocked with the ribs of the PVC profile.

(e) For the lining system which is not close fit to the existing pipe wall, the annulus between the outside of the liner and the inside of the host pipe and the space between the ribs of the profile shall be filled with grout.

(f) The role of the grout is to provide a load path from the liner pipe to the host pipe, to position the liner within the existing pipeline and top revent lateral infiltration along the liner/pipe interface. The reinforcing effect of the grout, if any, should not be included in the calculation of the strength of the profile. The grouting to get her with suitably designed end profiles shall provide water tight

terminations to prevent infiltration at the ends of the liner and atany cutouts for lateral connections.

(g) The liner design shall address the structural requirements in accordance with ASTM F 1741 or other relevant pipe design standards.

(h)

(a) For lining of sewerage pipes less than 900mm dia the liner may be installed with or without steel reinforcement. The lining shall be installed with diameter reduction at no more than 15 percent. Anyannulus between the lining and the host pipe shall be filled with cementitious grout for fixed diameter system. However no grouting is required to fill the annular space between the outside of the liner and the inside of the host pipe when the liner pipe is expanded (closed fit system) until it presses against the interior surface of the existing pipe

(b) Design loads shall comprise the combination of earth pressures, hydrostatic loads and traffic loads for each particular lining. Traffic live load given in WRc SRM (2001) 4th Edition or AS 2566 Standard W7 Wheel loading are acceptable with the prior approval of the Engineer.

(c) All liners must be capable of resisting the combination of earth pressures, hydrostatic loads and traffic loads.

(d) For lining of sewer with diameter more than 900mm, only MWSL with approved steel reinforcements shall be installed. The annular spaces shall be filled with a cementitious grout as recommended by the spiral wound liner manufacturer/ supplier and approved by the Engineer prior to commencement of the work.

(e) The composite PVC and steel profiles shall provide a liner with sufficient strength, taking into consideration of the strength of host pipe, to meet the design requirements in accordance with the loading conditions specified. The proposed profiles of PVC, steel, and grouting together with detailed design methodology shall be endorsed by a Professional Engineer registered in India, and the detailed calculations shall be submitted to show that they meet the design requirements.

1.2 Material Requirements - Liner

(a) For extruded profile strip shall be made from unplasticized PVC compounds meeting the minimum requirements for cell classification 12344 or higher, as defined in ASTMD1784, or made from HDPE compounds meeting the minimum requirements for cell classification 334320C or higher, as defined in ASTM D 3350.

(b) The proposed PVC lining materials shall have the strength and chemical resistance to sewer system with a design life of not less than 50years (“Pickle Jar” test as stated in section 1.18 is acceptable for evaluation of chemical resistance of 50 years).

1.3 Material Requirements - Grouting

(a) Grouting shall be carried out with the aim of filling the annular space along the whole length of the sewerage pipes completely. Grout can be injected into the annular space through openings in the termination end seals or at cut outs for connections. Grout holes, if drilled into the liner pipe shall be reinstated and sealed with approved well-designed fitting caps. The grouting operation can take place either in a continuous stage orin lifts, depending on the condition of the host pipe, diameter and length.

(b) Grout to be used to fill the annular void space shall consist of Portland cement, water, and suitable admixtures.

(c) Flow characteristics, maximum drying shrinkage, and minimum compressive strength requirements for the grout shall be compatible with the design requirements for the renewed conduit and shall be compatible with the field conditions under which the grout will be in stalled

(d) At the terminations and cut-outs, a length of 300mrn of the annulus space shall be sealed with a suitable water activated quick setting Polyurethane gel or foam. This grouting may need to be carried out under wet condition.

1.4Material Requirements - Liner

a) For extruded profile strip shall be made from unplasticized PVC compounds meeting the minimum requirements for cell classification 12344 or higher, as defined in ASTM D 1784, or made from HDPE compounds meeting the minimum requirements for cell classification 334320C or higher, as defined in ASTM D 3350.

b) The proposed PVC lining material shall have the strength and chemical resistance to sewer system with a design life of not less than 50 years (“Pickle Jar” test as stated in section 1.18 is acceptable for evaluation of chemical resistance of 50 years).

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a) Grouting shall be carried out with the aim of filling the annular space along the whole length of the sewerage pipes completely. Grout can be injected into the annular space through openings in the

termination end seals or at cut outs for service connections. Grout holes, if drilled into the liner pipe shall be reinstated and sealed with approved well-designed fitting caps. The grouting operation can take place either in a continuous stage or in lifts, depending on the condition of the host pipe, diameter and length.

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d) At the terminations and cut-outs, a length of 300mrn of the annulus space shall be sealed with a suitable water activated quick setting Polyurethane gel or foam. This grouting may need to be carried out under wet condition.

1.6 Material Requirements – Steel Reinforcing Strip

(a) MWSL system shall utilize Type 304 stainless steel reinforcement or approved steel reinforcing strip with demonstrated corrosion resistance in the sewerage pipe environment.

(b) For MWSL system where the steel reinforcement would the exposed to corrosion in the sewer environment, the cold formed steel profile reinforcement shall be formed from Type 304 stainless steel or equivalent and to the design thickness proposed in the liner submission. The thickness, formed shape, and yield strength of the strip shall be compatible with the design requirements for the renewed conduit and the specified PVC or HDPE profile designation.

1.7 Material Marking and Handling

(a) The PVC or HDPE profile strip shall be distinctly marked on its inside surface at appropriate intervals with a code number identifying the manufacturer, date of manufacture, and profile designation.

(b) All other products required to complete the spiral wound lining renewal process shall be distinctly marked with product type and manufacturer.

(c) The product shall be inspected for defects at the time of manufacture and again in the field prior to installation. Defects to the PVC or HDPE profile include, but are not limited to, gouges, abrasion, flattening, cuts, punctures, and ultra-violet (UV) degradation. Defective product shall not be installed and shall be removed from the jobsite.

Handling and storage of the profile reels shall be in accordance with the manufacturer's instructions.

(d) All other products required to complete the spiral wound PVC lining renewal process shall be handled and stored in accordance with the manufacturer's instructions. Each product shall be accompanied by its relevant specification and MSDS information.

1.8 Submittals (prior to commencement of rehabilitation work)

(a) Notwithstanding some of following items have been submitted as per section 1.18, the Contractor has to resubmit these documents to the Engineer for approval prior to commencement of rehabilitation work if there is amendment of the document due to the changes of site conditions.

(i) Detailed design calculations for the structural lining system offered, Engineering properties of lining materials, proposed liner thickness for each sewer stretch and reduction in diameter, pre and post lining hydraulic calculations and durability performance data..

(ii) Flow diversion & management plan if required.

. (iii) Traffic management plan

(iii) Pre-installation cleaning method and CCTV survey of host pipe

(iv) Method statement for spiral winding process including details of all materials and equipment to be used during the winding process.

(v) Grout mix design (if applicable).

(vi) Method statement for annulus grouting stating the spacing and details of bulkheads, details of the bracing system, grout injection / vent holes, the number of grout lifts required to fill the annular space, and methods for repairing holes in the lining.

(vii) Mill certificate for the steel strip reinforcing confirming that the steel satisfies the requirements of this specification and the Contractor's design submittal.

(viii) Documentation for the profile strip material confirming that the material satisfies the requirements of this specification and the Contractor's design submittal.

(b) Upon completion of installation work, the Contractor shall submit the following documents to the ENGINEER for final acceptance of the work:

- Post-installation CCTV survey of the renewed conduit

1.9 Liner Installation

(a) Profile Winding

(i) Installation of the spiral wound PVC or HDPE lining shall follow closely the standard specification in ASTM F1741.

(ii) The existing pipeline shall be cleaned of any obstructions, to a

standard suitable for installation of the liner, and televised. All existing live service connections shall be precisely located longitudinally and radially, and logged for subsequent reinstatement following installation of the liner.

(iii) Bypass pumping is not mandatory for installation of the spiral wound liner. The contractor shall be responsible for deciding the need for flow diversion to allow successful liner installation. Spilling of any sewage in any situation will not be acceptable. The Contractor shall be responsible for the cost of all cleanup and associated with activities that may be required to rectify the effects of any spillage due to the liner installation.

(iv) The PVC or HDPE profile shall be wound using equipment that is either self-running or static. For the self-winding method, the winding machine traverses down the host pipe forming the spiral wound PVC lining conduit as it goes. For the static method, the winding machine operates from a fixed location and feeds the spiral wound PVC lining conduit into the host pipe.

(v) The winding process shall be continuous until the spiral wound lining reaches the end manhole. Joining of profiles will be as recommended by suppliers, subject to approval from the Engineer.

(b) Annulus Grouting

(i) Annulus grouting where required shall conform to the contractor’s approved submittals.

(ii) The Contractor shall submit the grouting plan as recommended and approval from the supplier (a) prevent flotation of the spiral wound PVC or HDPE conduit, (b) align the liner pipe within the host pipe so that the required annular space is maintained between the liner pipe and host pipe, (c) prevent excessive deflection or buckling of the liner pipe.

(iii) Grout shall be pumped into the annular space through predrilled locations around the circumference of the spiral wound PVC or HDPE conduit. The number and locations of the pre-drilled holes shall be subject to the approval of the Engineer. Vent holes shall be provided at suitable locations to permit air to be expelled from the annular space and to monitor grout fill levels.

(iv) Grouting may be performed in one or more lifts in order to completely fill the annular space. The Contractor shall submit his proposed method, subject to Engineer's approval, to check and verify that the annular space has been completely filled. Any holes made in the profile during the grouting operation shall be sealed using means and methods approved by the Engineer.

1.10 Completion of MWSL Work

(a) Ends of Renewed Conduit:

(i) The ends of the spiral wound PVC or HDPE conduit shall be securely grouted in position. The PVC or HDPE conduit shall be sealed to the host pipe with material capable of achieving a watertight seal.

(ii) The transition between the liner invert and the invert in the manhole base shall be rendered smooth to reinstate the sewer flow line with appropriate materials.

(b) Final Inspection and Acceptance:

(i) The completed spiral wound PVC or HDPE profile lining in the renewed conduit shall be continuous over the entire length of an installation run and be free from defects such as foreign inclusions, holes, cuts, tears, and grout voids. The renewed conduit shall be impervious against leakage out of the conduit to the surrounding ground or into the conduit from the surrounding ground.

(ii) Any defect which will or potentially could affect the structural integrity or performance of the renewed conduit shall be repaired at the Contractor 's expense using means and methods approved by the Engineer.

(iii) The Contractor shall perform a post-installation CCTV survey of the renewed conduit as required by the Engineer.

1.11 Reference Standards and Specifications

The MWSL system shall conform to the following standards, specifications, WRc Sewer Rehabilitation Manual and other relevant codes and standards where applicable:

(i) C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimen)

(ii) D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

(iii) D638 Standard Test Method for Tensile Properties of Plastics

(iv) D648 Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

(v) D 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

(vi) D1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compound

(vii) F1697 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Strips for Machine Spiral-Wound Liner Pipe Rehabilitation of Existing Sewers and Conduits.

(viii) F1741 Standard Practice for the Installation of Machine Spiral Wound Poly (Vinyl Chloride) (PVC) Liner Pipe for Rehabilitation of Existing Sewers and Conduits.

(ix) D 3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

(x) D 1505 Test Method for Density of Plastics by the Density Gradient Technique
(xi) D 1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
(xii) D 1693 Test Method for Environmental Stress-Cracking of Ethylene Plastics
(xiii) F 1473 Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins

1.12 Quality Assurance

(i) MWSL work shall be performed by a Contractor who has a proven record of performance for similar installations. The Contractor shall submit resumes for superintendents, foremen, and other applicable lead personnel for field installation crews demonstrating competency and experience to perform the work scope as defined in this specification and all other applicable contract documents.

(ii) Final Inspection: The renewed conduit shall be subject to a final inspection, and no such work shall be scheduled or started without having made prior arrangements with the Engineer to provide for the required inspections.

1.13 Testing and Quality Control for Spiral Wound Lining
(i) Test report shall be supplied prior to commencement of the works. The materials for spiral wound linings and steel reinforcements are specified above. The test for PVC profile shall be carried out meeting the minimum requirements for cell classification 12344 or higher, as defined in ASTM D 1784. The test for HDPE profile shall be carried out meeting the minimum requirements for cell classification 334320C or higher, as defined in ASTM D 3350. Test specimen for verification of cell classification shall be prepared by machining operations, or die cutting from a flat profile.

(ii) Type testing for stainless steel that is going to be use in rehabilitation works shall be carried out meeting the chemical composition and mechanical properties of 304 stainless steel.

(iii) The above tests shall be carried out by an accredited laboratory approved by Engineer or a reputable independent testing body if the tests can only be conducted overseas. New type tests shall be conducted if there is a change in manufacturer and/or change in source of materials during the course of the works.

VIII) Pipes for Jacking

(a) The pipes for jacking operation shall be MS pipe as specified in the Bill of Quantities or as directed by the Engineer in charge. The carrier

pipe of RCC NP3 pipe will be laid inside the MS pipe with proper joining & slopes as per specification & drawings.

(b) The supply of pipes shall be in accordance with the Specifications.

1.0 Precast Reinforced Concrete Pipes (Carrier Pipe)

(a) The precast reinforced concrete pipes shall be manufactured by a centrifugal or other equivalent process to be approved by the Engineer in charge. Design, manufacture and factory testing of the pipes and specials shall be to as per IS 458 (Latest Revision) and BS 5911-I (Latest Revision). The clear cover of concrete over steel reinforcement shall not be less than 50 mm.

(b) All pipes except for those less than 900 mm diameter shall be manufactured with two sets of grout holes. Each set shall consist of three grout holes spaced at 120□ on centres circumferentially located at the quarter points from either end of the pipe. Two of these grout holes shall be at the soffit of the pipe.

(c) The strength of the pipes shall be tested by the three edge bearing test. When subjected to the design load in such a test, the maximum crack width developed on the pipe shall not exceed 0.25 mm. All such tests shall be carried out at the expense of the contractor.

(d) The contractor shall submit full details of his proposals for the pipes, giving detailed drawings showing sizes, reinforcement and type of joints, calculations, together with the name of the proposed manufacturer, the place of manufacture, and the manufacturing processes to the Engineers incharge for approval. All workmanship and materials used in the manufacture shall be subject to the approval of the Engineers in charge who shall from time to time be permitted to inspect materials at source and the manufacturing processes in the factory.

(e) The pipes shall be sufficiently matured before they are used in the construction of the works. They shall be handled with extreme care to prevent the edges of the pipes from chipping. Repaired pipes shall not be allowed for use in the contract. The Engineers incharge may reject any pipes he considers not suitable for the works and these rejected pipes shall be removed from the site immediately. After factory testing and before despatch, every pipe and special shall be marked in accordance with the standard used. In addition, each pipe shall be marked with a number corresponding with the order of manufacture. Test certificates from the manufacturers or other relevant authority shall be submitted to the Engineers incharge.

(e) Where steel collars are used for pipe joints, it shall be made of weldable structural steel Grade 430 with minimum yield strength of 275 N/mm^2 as specified in Table 2 of BS 3601. The collars shall be of dimension and thickness to be approved by the Engineers incharge. Before fitted to the pipes, the collars shall be coated with approved anti-abrasive and anti-corrosive materials such as polymorphic resin

or equivalent. Joint seals shall be manufactured from EPDM, complying with the requirement of BS 7874 (Latest Revision).

(f) Where steel shield is utilised during the jacking operation, this steel shield shall be bolted to or by other approved means joined to the first piece of pipe which is being jacked.

(g) All the loading conditions during installation state and operation state to be submitted for the design review. Contractor shall submit the design of pipes for Engineers approval. Pipe shall be designed in accordance with the following standards (Latest Revisions):

IS: 456	Plain and Reinforced Concrete - Code of Practice
IS: 458	Precast Concrete Pipes (with and without Reinforcement)–
IS: 3370	Code of practice for concrete structures for the storage of liquids: (Part-
BS: 5911-I	Concrete pipes and ancillary concrete pipes, specification for unreinforced and reinforced pipes (including jacking
IS: 2062	Steel for general structural purposes
IS: 10748	Hot-rolled steel strips for welded tubes and pipes

Jacking Ring and Frame

(a) The Contractor shall be required to use a jacking ring. The jacking ring may be either of steel or concrete construction and shall be used at all times when a pipe is being jacked. This jacking ring will allow the jacking pressure to be distributed evenly around the wall of the pipe.

(b) The Contractor shall also be required to use a jacking frame during all operations. The jacking frame shall be designed to distribute the stresses from the jacks evenly to the jacking ring.

Jacking Operations

(a) The Contractor shall be fully responsible for the materials, equipment and facilities required in conjunction with jacking the concrete pipe.

(b) Before starting work, the Contractor shall submit to the Engineers incharge for approval, a detailed schedule of the entire jacking operation. Approval of such schedule shall not relieve the Contractor of his responsibility to provide a fully satisfactory installation. The Contractor shall be required to include with his submission evidence that he has successfully completed a jacking installation using procedures similar to those proposed.

(c) Where chemical stabilization of soil is used, a chemical grout shall be pressure injected into the soil over and ahead of the pipe jacking

to stabilise the soil. The chemical grout used shall have a demonstrated history of success for stabilizing soils similar to that through which the pipe is to be jacked.

(d) Where a mechanical shield is used, the Contractor must provide proof that the particular model of shield has been used successfully in soils similar to that on the site. The crew for the operation of the shield must be specialist, with experience in the use of that particular type of machine.

(e) After the jacking operations has begun, the Contractor may have to work continuously (24 hours per day) if required and directed by the Engineers incharge until the complete length of jacked pipe is installed.

(d) The pipes shall be jacked into place, true to line and level. The maximum tolerance allowable in the displacement of the centreline of the laid pipe from the design centreline is 50 mm in the horizontal plane and 15 mm in the vertical plane but there shall be no back fall at any point. Any pipe which is not laid in its correct position must be removed and re laid or adjusted to obtain its correct position.

(e) For precast reinforced concrete pipes, there shall be provision to prevent the relative movement between pipes at the joints by the use of steel gaiters or other approved methods during jacking operation. A packing piece of compressible material shall be provided at each joint and shall be securely held before the pipes are lowered into the thrust pit. Details of proposals shall be submitted to the Engineers incharge for approval.

(f) The Contractor shall be required to furnish and install and remove to the extent required, thrust blocks or whatever provisions that may be required for backing up the jacks employed in driving the pipe forward. The jacking pit shall also be equipped with steel rails or beams embedded in concrete. These rails or beams will be used for placement and alignment of each pipe during the jacking operation.

(g) The Contractor shall be fully responsible for the design and construction of the jacking and receiving pits, thrusting wall, installation of jacking equipment, sheeting, bracing etc. and for the efficient execution of the jacking operation. Full details of the proposals, including plant, shield machine, equipment, operating procedures, jacking pit and intermediate jacking stations etc, shall be submitted to the Engineers incharge and shall be fully satisfactory to him before construction work begins. However, review of the plans shall not relieve the Contractor from his responsibility to provide a safe and satisfactory jacking pit.

(h) The Contractor shall be required to monitor closely the progress of the jacking operation. Daily site records of thrusting pressures and the line and level measurements shall be properly

maintained and shall be available to the Engineers incharge at all times.

(i) It is the responsibility of the Contractor to ensure that the complete "tunnels" are watertight. If leakage occurs before completion or during the maintenance period, the Contractor shall carry out any remedial work that may be necessary to make the Works watertight all at his own expense. Contractor shall carry out the hydraulic testing as per IS 458 (Latest Revision).

(j) Contractor shall follow all safe working practices according to IS-4756 (Latest Revision) and BS-6164 (Latest Revision).

Cement Grouting

(a) The Contractor shall be fully responsible for preventing the occurrence of voids outside the pipe and if they occur he shall fill them with cement grout.

(b) Immediately following the jacking operation, the Contractor shall pressure grout the jacked section to fill all voids existing outside the pipe.

(c) (c) Systems of standard pipe, fittings, hose, and special grouting outlets embedded in the pipe walls shall be provided by the Contractor. Care shall be taken to ensure that all parts of the system are maintained free from dirt. Grout composed of cement, sand and other approved compound and water shall be forced under pressure into the grouting connections at the invert and shall proceed until grout begins to flow from upper connections. Connections shall then be made to these holes and the operation continued to completion.

(d) Apparatus for mixing and placing grout shall be of a type approved by the Engineers incharge. It shall be capable of mixing effectively and stirring the grout and then forcing it into the grout connections in a continuous uninterrupted flow.

(e) After grouting is completed, pressure shall be maintained by means of stop cocks, or other suitable devices until the grout has set sufficiently. After the grout is set, grout holes shall be completely filled with dense concrete and finished neatly without evidence of voids or projections.

1.1 Methods of Construction - Break-Outs from Shafts and Tunnels

(a) For the junctions of tunnels and shafts the Contractor shall submit, for the Engineer In charge’s agreement a method statement describing the details of the work, with drawings and calculations.

(b) Tunnel and shaft linings shall not be broken out until all necessary temporary works, including ground treatment, where

appropriate, have been completed to ensure the structural and geotechnical stability of the works.

(c)Temporary supports shall not be removed until so agreed by the Engineer in charge and the work for which they are required has been completed and the structure is capable of carrying the imposed loads. Once junction work is commenced it shall be completed as expeditiously as practicable.

(d) The break-out shall be of sufficient dimensions to accommodate the permanent structure to be built. Working space shall be kept to the minimum dimensions practicable.

(f) The break-up for a tunnel shall enable the construction of a stable initial length of an adequate tunnel lining, built within the specified construction tolerances.

(g) Ground improvement or other acceptable means shall be provided at shaft break-outs and break-ins as required to prevent instability of the ground as the sewer excavation exits or enters a shaft and elsewhere as required.

(h) The Contractor is deemed to have included in their price the cost of the interface with other contract including any ground improvement required to allow the access to the shaft or for the pipe jacking machine to be recovered as part of the works. The contract interface works are deemed to include shaft break-in or shaft breakout.

1.2 Limits of Surface Settlement

The method of jacking adopted by the Contractor shall be such that the initial surface settlement measured directly above the front face of the shield during the jacking operations do not exceed 25 mm and the maximum surface settlement after the tail voids are grouted shall not exceed 50 mm. Subsequently, the ground shall be reinstated to the original level not with standing, for the sections of pipeline near to sensitive structures, crossing under all roads along the route of the pipeline and paved area, the Contractor shall be required to incorporate in his jacking method measures to arrest the expected settlements so as to safeguard the integrity of the structures and road surfaces at all times. The Contractor shall ensure that the operational functions of these sensitive structures and traffic flows along all roads are not affected in any way by his work.

1.3 Shafts

Shafts - General

a) The working shaft shall be used for the construction of a manhole/chamber. The Contractor to construct the Jacking & Receiving pit as a permanent structural in RCC which would be served

as a manhole during operation. The Jacking pit/Receiving pit would be converted into the manholes with necessary modifications including construction of the top slab, manhole cover frame, pipe benching, CI rungs etc. The Contractor to prepare the design & drawings as per the permanent structure requirements & shall be got it approved from the engineer.

(b) The Contractor shall submit for approval to the Engineers in charge dimensioned drawings and calculations of the timbering or trench sheeting details for the working shafts. Each working shaft shall have a separate ladder bay for access, which shall be isolated from the part of the shaft used for hoisting materials.

(c) Prior to excavation, the shaft area shall be thoroughly checked for existing utilities and the appropriate measures taken in agreement with the Engineers incharge.

Shafts - Safety

(a) Shafts shall be provided with guard rails or rings at least 1.2 m above the surrounding ground level.

(b) Once sunk to final level, the shafts for regular personnel access shall be equipped with ladders and landings at intervals not exceeding 6 m. Protection shall be so provided

that neither ladders, supporting structures, nor persons using them are subject to risk

of accident, from the passage of skips, spoil or materials. All ladders are to be secured at the top and bottom.

(c) Should heavy plant and heavy loads have to be located in close proximity to any shaft, the Contractor shall take into account the effects of these loads as well as any ground loads when designing the shaft.

(d) The Contractor shall guard against distortion of shaft lining during construction and the possibility of shaft settlement or uplift at an intermediate stage of construction.

Temporary Shafts

(a) Full details of temporary shafts required by the Contractor's shafts working methods shall be submitted to the Engineers incharge for his agreement. Such shafts shall be adequately sized for all operations required for the execution of the works.

(b) Backfill for temporary working shafts shall comprise material agreed by the Engineers in charge.

(c) Where the Contractor wishes to recover temporary shaft linings the structure shall be removed in safe stages as backfilling proceeds, taking care to maintain the safety and structural integrity of the remaining lining. No part of temporary works shall be left in the ground within 2 m of the designed final surface level.

Shafts - Construction

(a) Shaft sinking shall be carried out by a method suitable for all the particular circumstances of the site including ground parameters, groundwater, depth and final purpose.

(b) Where work is done by underpinning, only that ground which may be safely excavated for the installation of one ring or one unit of support shall be carried out. Until that depth is properly secured by permanent or temporary shaft lining, no further excavation shall take place. In the case of pre-formed rings securing shall include grouting.

(c) Where work is done by a caisson operation, a cutting edge shall be fitted to the leading ring. The cutting edge shall be maintained at an even level all round during shaft sinking. Jacking arrangements or kentledge shall be adequate for the work. The Contractor's arrangements shall ensure the stability of any kentledge. A lubrication space shall be maintained around the full shaft periphery during sinking.

(d) Concrete walls installed by slurry trench or secant piling techniques shall comply with best practice. The Contractor's proposals shall be submitted to the S.O. for his agreement.

(e) Where low pressure compressed air is used to assist shaft construction, air decks and locks shall be designed by the Contractor to give adequate margins of safety against the air pressures to be used in the shaft. The Contractor's proposals shall be submitted to the Engineers in charge for his agreement.

(f) Full details of temporary works required by the Contractor's method of working for the construction of tunnel or pipe jack eyes in the shaft lining, shall be submitted to the Engineers in charge for his agreement.

(i) Shaft bases shall be concreted. The Contractor shall submit his proposals for the shaft base structure taking account of ground and groundwater forces and sealing the shaft against water entry.

1.4 Mild Steel Pipe Work (Jacking Pipe)

Spiral welded pipes manufactured from HR coils conforming to IS 10748 Grade 3 steel. Plate welded pipes manufactured from plates conforming to IS 2062 Grade B steel.

I. Manufacture of Pipes

- **General**

Steel pipe shall be either plate welded or spiral welded pipe.

The pipes shall be truly cylindrical, and straight in axis. The ends shall be accurately cut and prepared for field welding. The external circumference of the pipe pieces which are to be fixed adjacent to flange adapter with fixed outer diameter shall not deviate from theoretical one by more than 2 mm.

Any pipe or part thereof which develops injurious defects in the opinion of Engineer shall be rejected and shall be replaced by new pipe at Contractor’s expense.

II. Plate Welded Pipes

All pipes and specials shall be manufactured out of mild steel plates conforming to IS 2062 Grade B steel. The procedure of cutting plates to size, rolling of plates, post bending, tack welding, internal and external welding, facing should be such that it results in pipes of required diameter and thickness conforming to IS 3589, or equivalent or better international standards.

III. Spiral Welded Pipes

All spiral welded pipes shall be manufactured as per IS 5504. The requirements for weldable hot-rolled carbon steel strip in coils should conform to IS 10748 Grade 3. The process of manufacture should be such that it results in pipes conforming to IS 3589/IS 5504 or equivalent international standards.

Demonstration

Contractor shall make necessary arrangements to demonstrate at the pipe manufacturing mill individual items of work before commencement of works and during the works at intervals specified and as directed by the Engineer. No payment shall be made in this regard.

The works under demonstration shall include

(i) Manufacture of pipe and specials
(ii) Chemical and mechanical testing of pipes and specials
(iii) Machine and manual welding to qualify 'Welding Procedures'
(iv) External coating
(v) Cement mortar lining
(vi) Hydraulic testing after cement mortar lining at 12 bar pressure

Tolerances

Tolerances for pipes shall be in accordance with IS: 3589 except for the following.

Negative tolerance on pipe wall thickness is not permissible.

The permissible tolerances for specials for diameter, arm length and angular deviation shall be in

accordance with IS 7322/BS 534

Welding

Upon receipt of the order and prior to the start of works, the Contractor shall submit to the Engineer for his approval the 'Welding Procedure Method Statement' he intends to use for the field welding.

All components of pipe shell; either straight or bent etc. shall be welded by use of automatic arc welding machine by submerged arc process with alternating current. The strength of the joint shall be at least equal to that of the parent material. Manual welding shall be adopted only when machine welding is not possible.

The Contractor shall use electrodes of approved make and size, the size depending on the thickness of plate and the type of joint. Standard current and arc voltage required for the machine shall be used with necessary modifications as may be found necessary after experimental welding. For this purpose, samples of welded joints shall be prepared and tested in the presence of the Engineer for qualifying the Welding Procedure Method Statement. Only approved welding procedures shall be used throughout the work and if any modifications are to be made, the written permission of the Engineer shall be obtained.

All the shop and field welding shall conform to IS 4353, IS 9595 and IS 816.

All longitudinal / spiral and circumferential joints shall be Single-V or Double-V butt joints with or without backing plates. After completing the welding joints of pipes or plates from one side, and before the welding on the other side, the joints shall be back chipped/ gouged and ground to remove irregular penetration till the even surface is exposed. Gouging shall be resorted to when the plate thickness is above 6 mm.

All circumferential welds involving plates of unequal thickness shall be so kept that the inside surface of plates match to provide stream lined joints without alteration in the internal diameter.

The welding shall be of the best workmanship free from weld defects. In order to maintain a good standard in welding, welders shall be tested by the Contractor before they are entrusted with the job. Qualification standard for welding procedures, welders and welding operators shall conform to IS: 7307 and IS: 7310 (latest). Only those who pass the test shall be allowed to work on the job. Periodical tests as regards their competence shall also be taken at suitable intervals and those found incompetent shall be removed from the job. If an incompetent welder has already welded some pipes, all welding done by him previously shall be fully checked by X-ray in addition to the regular X-ray inspections. The defects if any shall be rectified to the satisfaction of the Engineer. All such check tests and rectification of defects shall be entirely at the cost of the Contractor. No pipes or steel sections shall be erected unless the work of the welder concerned has been proved to be satisfactory and qualified. Site welds shall be done by welders qualified for the various welding positions as per applicable IS codes and standards.

A record shall be maintained showing the names of welders and operators who have worked in each individual joint. Manual arc welding shall preferably be carried out by a pair of welders so that, by observing proper sequence, distortion can be avoided. A joint entrusted to a particular individual or a pair shall be as far as possible, completed by them in all respects, including sealing run. No helper or other unauthorised person shall be permitted to do any welding whatsoever.

The weldment should not become brittle or sensitive to blows and there should be no loss of toughness due to welding or heat treatment. The material after welding and heat treatment shall match with the base metal properties including original ductility. The weld should in no point be less than the nominal thickness of plate. A slight reinforcement as per IS codes shall be maintained on all weld joints. Final welding of closure gaps should be carried out within a temperature range of average air temperature 8° C.

- **Radiograph of welded joints**

Soon after welding, each longitudinal / spiral and circumferential welded length, the minimum length of the weld at random for each pipe shall be radiographed to detect welding defects, as per the requirements of IS 4853 and as directed by Engineer. This sampling will be at random to ensure 100% coverage of junctions of longitudinal / spiral and circumferential joints. If the results of such radiography fail to conform to the requirements, the Contractor shall carry out at his expense 100 % radiography test for the pertinent pipe as directed and fully satisfying the Engineer.

The percentage breakdown of radiography is as follows:

Pipes and Specials manufactured at Mill / Factory - 10%

Field joints welded at site - 5%

The weld ripples or weld surface irregularities and slag etc., on both inside and outside shall be removed by any suitable mechanical process to a degree such that resulting radiographic contact due to any remaining irregularities cannot mark or be confused with that of objectionable defect. The radiograph shall be made in strict accordance with the latest requirements and as per the latest and most efficient technique either with X-ray or gamma ray equipment.

The radiographs are to be marked in such a way that the corresponding portion of the welded seam and the welder can be readily identified. All radiographs will be reviewed by the Engineer to identify the defects and determine those which requires rectification. Defects that are not acceptable shall be removed by chipping, grinding or flame gouging to sound metal and the resulting cavities shall be welded. After rectification, the joint is to be radiographed again to prove the quality of the repair. The radiographs will be judged as acceptable or unacceptable by the Engineer based on the latest standards prescribed by relevant Indian Standard specification.

All X-rays shall be taken with equipment and by personnel of the Contractor. Films shall be developed within 24 hours of exposure and be readily accessible at all times for inspection by the Engineer. The Contractor shall provide for the use of the Engineer suitable X-ray viewing equipment. X-ray films shall be properly maintained by the Contractor. A complete set of radiographs and records as described in IS: 2595, for each job shall be retained by the Contractor. All films shall be identified by the number and chart prepared indicating location of any work associated with the pipe erection and such inspection shall be performed by the Radiographer at the discretion of the Engineer.

Hydraulic Pressure Test at Pipe Manufacturing Mill

A hydraulic test shall be carried out at the mill for each pipe length fabricated. All pipes and specials shall be subjected to hydraulic test after fabrication, but before application of protective coatings and linings.

Prior to testing, the pipe shall be inspected thoroughly and all the apparent defects in welding such as slag, porosity etc. shall be repaired by gouging and re-welding.

Each pipe shall be filled with water slowly and the pressure increased uniformly until the required test pressure is reached. The test pressure shall be as follows:

MS pipes and fittings – 12 bars.

The pipe to be tested shall be given a serial number which shall be painted with details such as pipe number, shell thickness, diameter, length etc. It

shall be entered in the register to be maintained by the Contractor. The register shall be maintained in suitable format giving the following information for each shell tested:

a) Serial No.
b) Pipe No.
c) Date of test
d) Specification, diameter and wall thickness
e) Weight of pipe shell tested
f) Maximum test pressure
g) Details of test performance
h) Name of Engineer’s representative witnessing tests

A copy of these details shall be furnished to the Engineer

For indicating the pressure inside the pipe an accurate pressure gauge of approved make duly tested and calibrated for the accuracy of readings shall be mounted on one of the closures which close the pipe ends.

The pressures shall be applied gradually by approved means and shall be maintained for at least 10 minutes or till the inspection of all welded joints is done during which time the pipe shall be hammered throughout its length with sharp blows, by means of a 1 kg. hand hammer.

The pipe shall withstand the test without showing any sign of weakness, leakage, oozing or sweating. If any leak or sweating is observed in the welded joints, the same shall be repaired by gouging and re-welding done after dewatering the pipe. The repaired pipe shall be re-tested to conform to the specified pressure.

If any leak or sweating is observed in pipe shell the pipe under test shall be rejected. The Engineer shall be supplied with two copies of the results of all the tests carried out.

No pipe shall be transported from the mill to the site and laid unless they have been hydraulically tested.

Tests and Inspection

The Contractor should submit results of inspection and testing covering the following in a suitable proforma, at the time of delivery of pipes in accordance with IS 3589/IS 5504. In case of discrepancybetween the requirements of the above standards the more stringent conditions shall apply. Each pipe shall be subjected to mechanical and hydraulic tests as per IS 3589 and the corresponding test certificates shall be furnished along with. The test specimen shall exhibit mechanical and chemical properties not lower than those specified for IS 2062 Grade B/IS 10748 Grade 3 steel. The tests should also include determination of yield strength, tensile strength, elongation and bend tests. Tensile tests shall be carried out in accordance with IS 1894 on a test specimen provided from each lot of 100

lengths of pipe. Guided bend tests shall be carried out in accordance with IS 3589/IS 3600. One bend test shall be carried out from each lot of 50 lengths. The tests shall comply with the requirements specified in IS 3589/IS 3600.

The Contractor shall submit the following:

- pipe manufacturing process
- grade of pipe
- chemical composition – product analysis
- jointers
- tensile test report
- flattening test report
- weld test reports
- hydrostatic test report
- bend test report
- radiography report
- weld test report

The Contractor should notify the Engineer, in advance of the procurement of materials and fabrication in order that the Employer may arrange for mill and shop inspection (including third party inspection). The cost of tests including third party inspection shall be at Contractor's expense. The Engineer in his opinion may reject any or all materials or work that does not meet with any of the requirements of this specification. The Contractor shall rectify or replace such rejected material/performed work at his own cost to the satisfaction of the Engineer. The Engineer has the right to have the material tested independently to confirm the quality of the works.

The Contractor shall supply free of cost required specimen of materials for testing by the Engineer at any time during the progress of work and shall bear the cost of such tests or retests to the satisfaction of Engineer.

No separate payment will be made for any of the inspection and tests mentioned above and the rates for the items concerned shall be deemed to have been included in Contractor's item rates.

Mechanical Tests

The test plates shall be subjected to all mechanical tests as per the approved Method Statement, or as otherwise reasonably directed by the Engineer. Tests shall be carried out in accordance with relevant standards. The tests shall include determination of yield strength, tensile strength, elongation and bend tests. Tensile tests shall be carried out in accordance

with IS 1894. One test plate shall be provided for from each lot of 100 lengths

If a test specimen shows defective machining or develops flaws not associated with welding, it may be discarded and another specimen submitted. The welded joint shall exhibit mechanical and chemical properties not lower than those specified for IS 2062 Grade B.

Guided Bend test shall be in accordance with IS 3589 /IS 3600. One bend test shall be carried out from each lot of 50 lengths. The test shall comply with the requirements specified in IS 3589/IS 3600.

The field welded joints shall be tested in accordance with the procedure laid down in IS 3600. One test plate shall be taken for every 10 joints and shall be subjected to mechanical and chemical tests as specified above.

Re-tests

If the results of tests of any lot do not conform to the requirements specified, retests of two additional specimens from the same lot shall be made, each of which shall conform to the required specifications. In case of a failure of one or both, gouging and repairing shall be carried out to the particular lot of joints from which the samples have been taken as directed by the Engineer before the lot can be accepted. The rectification process also shall have adequate test plates and they shall be tested for compliance with the IS codes/standards.

In case both the samples yield satisfactory results in the re-test described above, gouging and repairing will be required to be carried out on the joint which has failed in the initial test only.

All charges in connection with re-testing of the welded samples including machining, testing etc. shall be borne by the Contractor.

Marking

All pipes and specials shall be carefully marked for identification in the field. The marking shall be on the side which will be the inside of the pipe after bending. The marking operation shall be conducted with full size rulers and templates with suitable paints.

The following information shall be clearly mentioned on each pipe and special.

Manufacturer’s name with his registered trademark

Pipe / special with its serial number

Process of manufacturer and type of steel

Outside diameter (mm)

Pipe wall thickness (mm)

Length of pipe / angle of bend (in degrees)

Date of manufacture of pipe and special

Test pressure

After the hydraulic tests on the specials the direction of flow shall be stamped in a prominent manner. **Transportation, Handling, Stacking and Inspection**

- **General**

All pipes and specials manufactured at the mill shall be transported to the site of laying after cleaning them internally, etc. Vehicles on which pipes are transported shall have a body of such length that the pipes do not overhang. Pipes should be secure during transit. To ensure that laying of pipes is not held up at any time, the Contractor shall maintain an adequate stock of standard specials, flange rings, plug plates, manhole covers and short length of smaller diameter pipelines at site in his field stores in consultation with the Engineer. Whenever possible, the Contractor shall arrange one full month's requirement of pipes, specials, etc. stacked suitably along the alignment. All gaskets, nuts and bolts flange adaptors and other similar items shall be stored in dry conditions, raised off the ground in sheds or covered areas. Until required for incorporation each rubber ring or gasket shall be stored away from windows, electrical equipment and other materials like oil and chemicals and also from heat and cold. Where items require special storage requirements, the method of storage shall be to the approval of Engineer and in accordance with manufacturer's requirements. Storage areas shall be set out to facilitate unloading, loading and checking of materials. End covers and other protection shall not be removed until incorporation of the pipes or fittings into the Works. The Contractor shall provide 2 (two) sets of accurate 'Go" and 'No Go' ring gauges to measure the diameter of pipes, specials and fitting for the use of the Engineer at no extra cost.

- **Transportation and Handling**

The pipes and specials shall be handled in such a manner as not to distort their circularity or cause damage to their surface. Contractor shall provide temporary props in order to prevent any sagging of the pipes while they are stacked in their yard and while transporting to the site of laying. The props shall be retained until the pipes are laid. Details of proposed propping (strutting) system shall be submitted to Engineer for approval and if required by the Engineer, the method of propping (strutting) shall be demonstrated and tested at site. Valves shall not be lifted by the spindle

Pipe handling equipment shall be maintained in good condition and any equipment which in the opinion of the Engineer may cause damage to the pipes shall be discarded. Under no circumstances shall pipes be dropped, be allowed to strike one another, be rolled freely or dragged along the

ground. No defective/damaged pipe shall be used in the works without rectification to the satisfaction of the Engineer. Any damage to the coating shall be repaired by the Contractor at his own cost to the satisfaction of the Engineer.

- **Stacking and Inspection**

The Contractor shall keep a responsible representative to take delivery of pipes, specials and appurtenances, etc., transported from the pipe manufacturing factory or a stock yard. Pipes and appurtenances should be handled, stored and stacked in a suitable manner as directed by Engineer. Padding shall be provided between coated pipes and timber skids to avoid damage to the coating. Gaps must be left between stacked pipes to permit access from one side to the other. The pipes, specials and appurtenances received at site shall be inspected and defects such as protrusions, grooves, dents, notches, damage to the protected coating, etc., shall be pointed out to the Engineer at site and in acknowledgement challans. Such defects shall be rectified or repaired by the Contractor at his expense, to the satisfaction of the Engineer. It will be the responsibility of the Contractor to protect the pipes, specials and other items stacked along the alignment against any possible damages or theft.

External Coating

Unless otherwise specified or stated on the drawings the pipeline of diameter more than 1000 mm to be laid underground and the exposed pipeline supported on saddles shall be cement mortar coated

- **External Guniting**

Cement mortar coating shall be in accordance with IS 1916.

(i) Cement shall be Portland Cement in accordance with IS 8112
(ii) The cement content shall be 600 kg/m^3 and water : cement ratio by mass shall not exceed 0.3:1
(iii) A length of 15 cm at each end of the pipe shall be left ungunited to facilitate site welding. The end faces shall be vertical.

- **Mix Proportion**

Cement mortar shall consist of 3 parts sand to 1 part cement by volume. The water in the mixture shall be carefully controlled so as to attain the required strength and so that the mortar will not run, sag or segregate.

- **Thickness of coating**

The minimum thickness of the coating shall be 25 mm with a positive tolerance of 3 mm and no negative tolerance. Checking of the coating thickness shall be by non-destructive means such as ultrasonic thickness gauge.

- **Surface Preparation**

The surface of all pipes to be coated with cement mortar shall be thoroughly cleaned by hand or by sand steel grit blasting if necessary. After cleaning the external surface of pipe shall be given a coat of cement wash.

All oil and greases on the surface of the metal shall be removed thoroughly by flushing and wiping using suitable solvents and clean rags. The use of dirty or oily rags will not be permitted. All other foreign materials shall be moved by buffing or by scrapping and wire brushing. After cleaning, the pipe shall be protected and maintained free of all oil, grease and dirt that might fall upon from whatever source until the pipe has received its cement mortar coating.

If blasting is necessary, all metal surfaces shall be thoroughly blasted to bright metal. Blasted surface which acquire a coat of rust shall be cleaned/reblasted as directed by the Engineer

- **Reinforcement**

Reinforcement for the coating shall comprise of 50 x 50 x 3 mm wire mesh conforming to IS 1566 and 8 mm dia. bar to IS 1786. The mesh sheets shall overlap each other by a minimum of 100 mm and be tied with mild steel wire at 200 mm intervals. The reinforcement shall be held off the pipe wall by a series of 10 numbers equally spaced 8 mm dia reinforcement bars which shall run the full length of the coating. Clear cover to the reinforcement shall be in accordance with IS 1916.

- **Application**

The pressure in the lower chamber of ‘Cement Gun’ shall be sufficient to produce a nozzle velocity of 115 to 150 m/sec when a tip with 19 mm opening is used. The compressor used shall be of an adequate capacity to maintain a pressure of at least 2.8 kg/cm^2 at the gun end. The nozzle shall be held at such a distance (65 to 100 cm) and position so that the stratum of flowing materials shall impinge as nearly as possible at right angles to the surface being gunited. All deposits of loose sand shall be removed prior to placing any layer of gunite. Gunite shall be shot in one coat to the specified thickness. Every precaution shall be taken to prevent the formation of sand pockets and if any develop, they shall be cut out and replaced with satisfactory machine placed material. No hand patching will be allowed. The Contractor shall apply the coating in such a manner that no sloughing shall occur at any time during or following its application.

Gunite shall be placed in the top and sides of the pipe, then screeded to a uniform thickness and the ground lines or blocks removed. All rebound and waste materials shall then be removed by air blowing and gunite placed in the bottom of the fittings and screeded. When completed, the coating shall be concentric with the barrel of an even thickness. The entire surface shall then receive a final flash coat of gunite and shall be steel towelled to a true

surface equal in smoothness to the spun lining in such a manner not to impair the bond between mortar and steel plate. The guniting and surface finishing shall complete in set and shall be applied continuously without the use of construction joints. In case, for any reason whatsoever, the cement does not adhere to the walls of pipes and sloughs off, swabbing the pipe with cement slurry shall not be permitted.

If for any reason it is necessary to interrupt the placing of the gunite for a length of time that will result in the material taking a permanent set, a square shoulder shall be formed at the ends of the sections and/or elsewhere by shooting against a back or by working with a trowel or other suitable tools the irregular edges of the material last placed to a clean unbroken surface face perpendicular to the pipe that will provide a suitable connection or construction joint between such material and the material to be placed subsequently. When performing this work care shall be taken not to shatter or disturb the material remaining in place or disturb the embedded wire mesh. Before placing fresh material against the surface of such joints, they shall be carefully cleaned and wetted to ensure a good bond between the fresh material and that previously applied.

The ungunited portion at the ends of the pipe lengths left for the purpose of field welding shall be coated with M15 concrete by hand after the field welding and hydraulic testing are completed.

- **Curing**

After the mortar has set, but not later than twelve (12) hours after application of the coating, curing shall be commenced. Coating shall be kept continuously moist and in the shade for at least 14 days.

- **Inspection**

Pipe coatings shall be inspected prior to transports, to laying site and broken, defective or otherwise unsatisfactory areas may be rejected at any time during construction. All defective areas shall be made good to the satisfaction of the Engineer. Coating cracks over 0.25 mm wide or over 500 mm long shall be made good.

- **Tests**

Compressive strength test of concrete shall be conducted on 150 mm cubes in accordance with IS 516. The number of tests shall be at least 4 cubes for each age and each water cement ratio for each days work. The concrete mix shall have a minimum characteristic compressive strength of 25 N/mm^2 at 28 days.

- **Fiber Reinforced Coal Tar Enamel Coating**

Unless otherwise specified or stated on the drawings the pipeline of diameter 1000 mm and less to be laid underground and the exposed pipeline supported on saddles shall be externally coated with Fiber Reinforced Coal Tar Enamel at pipe manufacturing mill.**)**

SECTION 8:

DRAWINGS

(Annexed in Kppp Portal separately)

SECTION 9:

BILL OF QUANTITIES

(Filled vide Kppp portal under financial document through work template)

Note:

(1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities (refer: ITB Clause 11.2 and CC Clause 37.2).

(2) Unit rates and prices shall be quoted by the Tenderer in Indian Rupees.

(3) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITT Clause 24.1 (b)]

SECTION 10:

FORMAT OF BANK GUARANTEE FOR SECURITY DEPOSIT

To: _____ [name of Employer]
_____ [address of Employer]

WHEREAS _____ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of Rs._____ [amount of guarantee] [63]_Rupees_____ _____[in words], and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee][64] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 30 days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor _____
Name of Bank _____
Address _____
Date _____

[63] An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract.